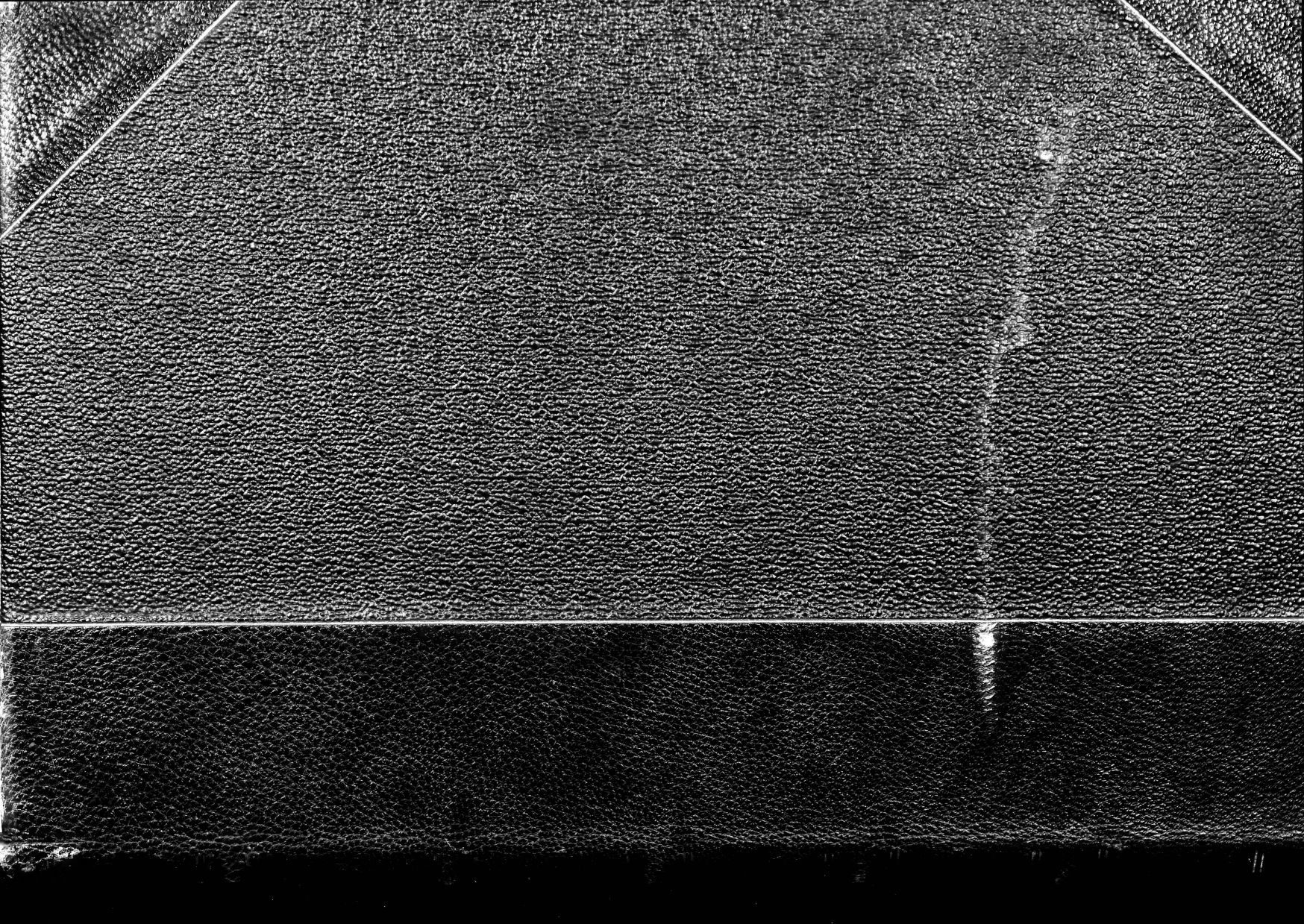

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MAY, 1911.

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THE JOURNAL
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MAY, 1911.

# MOLASSES AND SUGAR FOODS FOR LIVE STOCK.

WM. GOODWIN, M.Sc., PH.D.
*Principal of the Midland Agricultural and Dairy College, Kingston, Derby.*

MOLASSES, or treacle, which is well known as an article of human diet, has also served as a food for horses and cattle, particularly during the past twenty-five years. This has been largely due to the development of the beet sugar industry in Europe, for molasses is the uncrystallisable residue left in the manufacture of sugar, either from the juice of the sugar cane or the sugar beet. Previous to the above-mentioned period, molasses had been used in various parts of England, particularly in Norfolk, as a food for fattening cattle, but the frequent rises in price prevented more than small quantities being employed. When the price of molasses was low, then it was used to a considerable extent in certain districts, for it was recognised that where much straw had to be fed, a sprinkling of molasses, thinned down with water, made the chopped straw palatable to stock.

Unpurified molasses, whether from sugar cane or sugar beet, is a thick, brown syrup with a peculiar, sharp smell. When it is bleached it gives the well-known golden syrup, which is largely used for human food and in the manufacture of confectionery of various sorts. The improved methods which are now in vogue in the sugar factories, both in the boiling down of the juice and in the separation of the crystals of sugar, have resulted in the molasses being of poorer quality than formerly. In the older processes of sugar making, before vacuum pans were employed and when the sugar was left to

crystallise and the molasses simply drained off, a product was left which contained as much as 60 per cent. of saccharose,* along with some 10 per cent. or more of glucose. The use of centrifugal machines in the separation of the sugar crystals and the employment of chemical methods for extracting as much sugar as possible from the molasses have, however, made a considerable difference in the actual sugar content of the latter.

At the present time a medium grade cane molasses contains from 30 to 35 per cent. of saccharose, and from 25 to 30 per cent. of glucose and other sugars. The detailed analysis of a low grade cane molasses, such as is used for cattle feeding, is given as:—

| | |
|---|---|
| Cane sugar ... ... ... ... ... ... | 27·50 per cent. |
| Invert sugar, dextrose, and levulose ... ... | 23·50 ,, |
| Other carbohydrates and nitrogenous albuminoids | 14·25 ,, |
| Ash or mineral matter ... ... ... ... | 9·25 ,, |
| Water ... ... ... ... ... ... | 25·50 ,, |

Average medium or low grade cane molasses contains from 50 to 60 per cent. of various sugars, along with some 10 per cent. of crude protein.

Beet sugar molasses is almost identical, both in appearance and physical properties, with cane molasses. The colour is perhaps a little darker, and the smell less pleasant. Beet molasses, like cane molasses, contains less sugar than formerly, owing to improved methods of concentrating the juice and separating the crystals of sugar. These improvements were, in fact, first introduced into beet sugar factories, and they were so successful that they were adopted by the manufacturers of sugar from sugar cane. An average analysis of beet molasses may be taken to be as follows:—

| | |
|---|---|
| Nitrogen-free extract substances (carbohydrates) | 60·5 per cent. |
| Crude protein ... ... ... ... ... | 10·3 ,, |
| Ash... ... ... ... ... ... ... | 7·2 ,, |
| Water ... ... ... ... ... ... | 21·5 ,, |

As regards the nitrogen-free extract substances or carbohydrates, the amount of these present in beet molasses is practically identical with that found in cane molasses, so

* Saccharose, cane sugar or sucrose. All these terms apply to the one sugar which is seen in almost pure form in ordinary lump sugar. This sugar, which is a typical carbohydrate, differs from glucose in crystallising more readily. Glucose is found in molasses largely because of the "inversion" of the cane sugar during the boiling down of the juice.

that the feeding value of the two as regards carbohydrates (mainly sugars in each case) is the same. The composition of molasses may vary somewhat from the above figures, but that is due more particularly to the percentage of water present. Calculated upon the dry matter, the quality of molasses, even of widely differing origin, is remarkably constant as regards the sugar which it contains.

Previous to September 1st, 1903, all molasses imported into this country had to pay a duty of 1*s*. per cwt., but since that date exemption has been granted in the case of molasses intended to be used solely as a food for stock or in the manufacture of cattle foods. This privilege has enabled the West Indian sugar planters to dispose of their molasses to better advantage than previously, since cane sugar molasses is generally preferred by the feeder.

Enormous quantities of molasses are produced annually in the large Continental factories which make sugar from sugar beets, and most of the reliable investigations on the use of molasses as a food for stock were, in fact, made with beet molasses. The agreement in the composition of cane and beet molasses, which has already been pointed out, enables the results of these investigations to be applied equally well to cane molasses. There are one or two minor differences between beet and cane molasses, to which attention will be called later on.

The nitrogen-free extract substances, or carbohydrates, which are present in molasses are mainly sugars, of which cane sugar (saccharose) is the chief representative. Invert sugar—dextrose and levulose—raffinose, as well as varying quantities of organic substances, gums, mucilage, &c., which are not really sugars, are also found in molasses.

The feeding value of cane sugar was tested as long ago as 1855 by Lawes and Gilbert, who came to the conclusion that it was equivalent to that of starch. Since that time a great deal of experimental work has been done with sugar, either in the pure form or in molasses, and the results on the whole agree with those obtained by Lawes and Gilbert. The very careful investigations of Kellner have, however, led him to place a less value upon sugar than upon starch for the production of body fat. The reason of this may almost un-

doubtedly be ascribed to the activity of micro-organisms in the intestinal tract, which bring about greater losses from fermentation in the case of sugar than they do in the case of starch. The other sugars—dextrose, levulose, raffinose—present in molasses, as well as the nitrogen-free extract substances which are not sugars, have not been carefully studied, but it may safely be assumed that the former group has a feeding value closely allied to that of cane sugar.

The nitrogenous substances found in molasses are not true protein or albuminoids like those present in such a feeding stuff as linseed cake. They are of an amide nature, and substances of this class have not the food value of the real proteins. Opinions differ as to the value which should be given to amides, and in some respects modern views are not in accordance with what was previously thought to be the true state of affairs. Recent investigations have gone to show that in the case of ruminants it is possible for these amide substances to be built up into true proteins in passing through the walls of the intestine, so that they may, under certain circumstances, act like the true proteins found in feeding stuffs. Where the animal is well nourished it is safe to say that these amide nitrogenous substances have a feeding value which is not superior to the carbohydrates, for they do not then play the part of true proteins in building up tissue, but simply yield up the energy which they contain, and this can go to the heating of the body, the performance of work, or the formation of body fat.

It is necessary that this point should be understood by the buyer, for it is not right that he should be led to think that molasses contains the same class of nitrogenous substances as does a concentrated feeding stuff, the money and feeding values of which are considerable. On this account the practice adopted in some analytical reports of multiplying the nitrogen found in molasses or molasses feeds by the usual factor for converting it into true protein or albuminoids, and then allowing this figure to appear as though it really expressed a certain amount of protein, is to be strongly deprecated.

Another point which ought also to be noticed in this connection is the fact that these amide substances—aspartic acid,

glutamic acic, leucine, and, above all, betäine—have an irritant effect upon the digestive and excretory apparatus, and tend to cause scouring and an increased secretion of urine. This laxative effect is very noticeable, in fact, with some kinds of molasses, and may be traced to various causes. The sugar itself is probably the main cause, for it is well known that it has this effect; and added to this is the irritation due to the amides, as well as that due to the salts, particularly in the case of beet molasses. These salts, which are of an alkaline nature, and are principally potash salts of organic acids, are recognised as having an irritating action upon the kidneys, which causes more urine to be secreted, and so the animal "stales" more frequently than it otherwise would. With cane sugar molasses the irritant effect is less noticeable, although the sugar still exercises a laxative action.

There is no fat in molasses, or, at most, only a trace, so that the actual food nutrients in molasses itself are the nitrogen-free extract substances, principally sugars, and some 10 per cent. of amides, the feeding value of which is questionable, and probably ought not to be reckoned superior to the nitrogen-free extract substances themselves.

The percentage of water in molasses is of importance, for frequently the amount exceeds that given in the analyses already quoted, and if so, not only is the buyer likely to be defrauded, but the molasses is then very liable to ferment and become worthless as a food. Molasses is often, in fact, made more fluid, and so easier to handle, by blowing steam into it, which may be done to such an extent that the percentage of water may be raised to 30 per cent. or more.

As regards the feeding of molasses there is ample proof that in moderate quantities it is a useful and economical food for all classes of stock. By gradually accustoming the animals to its use, it is possible to feed large amounts at a time without causing scouring, although the laxative effect is certain to be noticed. It is stated that fattening cattle may be fed as much as 8 lb. per day per 1,000 lb. live weight, but it is questionable if these large quantities are economical, in view of the fact that when an excessive amount of carbohydrate material is given the digestibility of the other constituents of the ration is lowered.

Dairy cows have been fed 3 lb. and more daily per 1,000 lb. live weight without ill effect, although in some feeding experiments with molasses it has been found that the milk increased in quantity at the expense of quality. The butter from cows receiving molasses is not influenced detrimentally.

For horses, a moderate use of molasses has been recommended, not only on account of its feeding value, but also because in stables where it was used the attacks of colic were much less frequent. Large horse-owners have been known, however, to object to molasses because of its effect in causing the animal to urinate excessively. Molasses in some form or other has also been fed to sheep and pigs, with, on the whole, satisfactory results. The conclusions, in fact, to be drawn from the use of feeding treacle are that in moderate quantities it is a good food, and may be particularly useful where it is necessary to feed much straw or inferior hay. A pound or so of treacle diluted with warm water and poured over chopped straw or hay will induce the animal to clean up its ration very completely. The flesh of animals fed excessively upon molasses is not of the best quality, and animals soon lose condition again, although they may fatten rapidly.

When beet molasses came into general use it was held to be a dangerous food for young or pregnant animals, particularly the latter, as it tended to cause them to abort. In the same way molasses was decried as an article of diet for male breeding animals, as it was thought to cause sterility, particularly in the case of bulls. Probably there was foundation for these beliefs, for it has been observed in other connections that when male animals are receiving considerable quantities of sugar the reproductive functions are diminished.

When molasses or feeding treacle is used, the best way to give it to stock is to mix the quantity required with warm water and pour it over the dry food, and then stir the whole well. It is found, however, and this cannot be denied, that treacle is not a nice material to handle, for it flows slowly from a cask, and its stickiness is a distinct drawback. Also, good quality treacle is often pilfered by the attendants, although this can easily be prevented by mixing with it a little coal-dust. The objections to which reference has just been made have resulted in some absorbent substance

being used to soak up the molasses, and by employing suitable materials it is possible to prepare molasses feeds which are practically dry, and so very convenient to handle. These molasses, or sugar feeds, have increased enormously during the past few years, and their composition and feeding value are widely different. Where the absorbent material or "base" is itself a food, the two together may make an article having a well-balanced feeding value. For example, palm nut meal from which the oil had been extracted has been used as an absorbent of molasses, and the resulting product was found to be most satisfactory, because the meal, being rich in protein (albuminoids) and also containing a little fat, balanced the purely carbohydrate nature of the molasses. One molasses food of this kind was found to have the following composition :—

| | | |
|---|---|---|
| Nitrogen-free extract substance | 48·68 | per cent. |
| Protein ... ... ... ... | 14·78 | ,, |
| Fat ... ... ... ... | 4·60 | ,, |
| Crude fibre ... ... ... | 15·08 | ,, |
| Ash ... ... ... ... | 6·37 | ,, |
| Water ... ... ... ... | 10·49 | ,, |

This analysis corresponds closely with that of coarse bran, and it must be noted that a good deal of the protein is true protein, and not amides, as it would be in molasses alone.

Cocoanut meal, dried brewers' grains, malt-coombs, and dried beet pulp or slices are also good absorbents of molasses, for although they may not absorb as much as some other materials to be mentioned later they are, nevertheless, foods in themselves. Chopped hay, clover, straw, &c., have also been used as bases in the preparation of molasses feeds, and here again their food value comes into account, in addition to that of the molasses. Dried spent hops is another absorbent which is used in a well-known molasses feed, and here the food value of the base is perhaps half that of dried brewers' grains.

Another class of sugar feeds is that in which the molasses is absorbed by bran, pollards, or other miller's offals, or some more starchy material like tapioca meal. These feeds also have a food value in addition to that of the molasses alone.

Lastly, there is a class of molasses feeds in which the absorbent material or base is of little or no food value. Perhaps the most characteristic example is furnished by a

mixture of peat moss and molasses. It was soon discovered that peat moss is a very good absorbent of molasses, and that twenty parts of this material could soak up eighty parts of molasses and give a product which could be called dry. Some varieties of peat are more suitable than others, and at the present time these peat molasses mixtures are sold in large quantities. Some are satisfactory from the point of view of preparation, whilst others are manifestly unsuitable for food, being coarse and sour, and often possessing an objectionable smell. The chemical analyses of these molasses feeds often fail to show their exact composition, for no distinction is made between the true protein (albuminoids) and the amides, nor is the percentage of actual sugar always given. It would be invidious to give the names of these proprietary peat-moss molasses feeds, but the accompanying table shows the analyses of several of the best known British and Continental makes.

| | I. | II. | III. | IV. |
|---|---|---|---|---|
| Nitrogen-free extract substances... | 55·81 | 52·48 | 52·60 | (40·0) |
| Protein ... ... ... ... | 8·75 | 8·25 | 8·34 | 7·44 |
| Oil ... ... ... ... ... | 1·20 | 0·73 | 0·87 | 0·28 |
| Crude fibre... ... ... ... | 4·81 | 6·63 | 5·85 | — |
| Mineral matter ... ... ... | 7·03 | 7·54 | 7·54 | 6·8 |
| Water ... ... ... ... | 22·40 | 24·37 | 24·85 | 25·2 |
| Containing sugar ... ... ... | — | 36·44 | 31·7 | 40·0 |

The percentage of sugar in these peat molasses foods is thus seen to vary between 31 and 40 per cent., and the protein stands at 8 per cent. on an average. As neither peat nor molasses contain more than a small amount of true protein (albuminoids) the value of the protein shown in the analyses is certainly not what it would be in oats, for example. The small amounts of fat in peat molasses should also be noted.

Instead of peat moss, various other absorbents, such as the pith of the sugar cane (known as megass or bagasse), ground husks of earthnut, crude cellulose, &c., are used. The feeding value of peat moss or the other absorbents just mentioned has not been accurately determined in every case, but so far as peat is concerned Kellner and Pfeiffer have shown that not only is it valueless from the feeding point of view, but that it withdraws from the body a certain quantity of nutriment.

This is because the peat is only digested to a very slight extent, and the undigested portion takes with it what otherwise would go to nourish the body. In other words, peat moss has a negative food value.

The writer, whilst at the South Eastern Agricultural College, found, from direct digestibility trials with sheep, that the crude fibre in a food said to be composed of pure cellulose and cane sugar molasses was only digested to the extent of 10 to 12 per cent. In the case of a well known feed, in which megass is said to be the base, the digestibility coefficient of the crude fibre was about 40 per cent.

The buyer of any molasses feed ought to consider what is the feeding value of the absorbent material, and what is the money value compared with the molasses itself. It is unquestionably much nicer to handle some of these dry preparations instead of having to deal with the molasses itself, but often this convenience is paid for at a high rate, and a thrifty buyer would generally do far better if he bought molasses and mixed it himself with the dry portion of the ration as directed in the earlier part of this article.

It should further be noted that these molasses feeds often contain a high percentage of water (see table, page 104), and they are then very liable to ferment, particularly if the bags containing the feed are kept in a warm place close together. Once fermentation begins the sugar is attacked by micro-organisms of various kinds, and converted into acids, or otherwise so changed that its feeding value is greatly diminished.

The writer, during the past few years, has examined a large number of molasses feeds kept under various conditions, and in the case of some of them this tendency to ferment was very great, and quickly rendered the food unfit for use. Others remained unchanged for a long time if stored in a cool place with plenty of ventilation and on a board floor.

If it were recognised that a molasses food is a mixture of an absorbent and molasses, and that where the former has no feeding value the latter alone comes into consideration, much of the present advertising of those foods, which are really only valuable for the molasses (sugar) which they contain, would not yield much return to the advertisers.

The ears of a sensible buyer of molasses feeds should also be closed to the fanciful statements which are often made, particularly as regards peat molasses, as to the secondary actions of this mixture, *e.g.*, the improvement which it causes in the digestion of the food, the neutralisation of the alkaline salts of the molasses by the acids of the peat, the effect upon worms in the body, &c. They may or may not have some foundation in fact, but healthy animals have no need of such secondary actions, and from the feeding point of view they are not worth consideration. Feeding treacle can be bought at the present time for about 95*s*. per ton; it contains, as the analyses already quoted show, from 50 to 60 per cent. of sugars of various kinds, so it is possible to compare the prices and feeding values of molasses feeds with these figures.

Lastly, it may be mentioned that molasses is used to a considerable amount in the manufacture of compound cakes. It there serves to bind together the dry materials, and allows them to be pressed into a cake. At the same time it imparts a sweet taste to the whole, so that such cakes are generally very palatable to stock, and readily eaten by them. That it may also serve to disguise some unpalatable constituents of the cake must also not be forgotten.

## LABOURERS' COTTAGES.

WILLIAM J. JOLLY.

IT will be readily admitted that many farms have not been adequately equipped with suitable and sanitary housing for the workers on the land, and during the last three or four decades the agricultural depression has not improved conditions in this respect. Consequently, it is no uncommon thing to find that the upkeep of cottages, farmhouses, and buildings has been much neglected, frequently to such an extent that they have either fallen into disuse or been allowed to get into a state beyond repair.

The difficulties connected with the labour question on large farms and the provision of suitable cottages seem to become more acute every year, though in order to ensure proper cultivation and management, and to maintain the rental value, it is necessary to provide sufficient cottages,

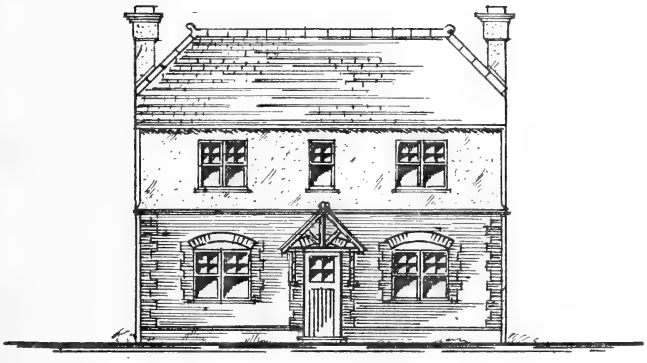


FIG. 1.—DESIGN FOR A SINGLE COTTAGE TO COST FROM £200 TO £225.


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which, moreover, require to be of a higher class than formerly, owing to the general improvement in taste and rise in the standard of comfort which have resulted from the wider diffusion of education and sanitary science.

The main deterrent to the provision of such cottages is, perhaps, the increased expenditure in all building operations, chiefly owing to the advance in the price of labour. It is generally recognised that the return on the outlay in building cottages is so small as to be unremunerative if the rent that can be obtained is the only consideration. When the rates, taxes, and other outgoings (including the provision of a sinking fund where a loan has been obtained) have been set against the rents that can be expected from labourers, it is obvious that the return will be a small one, though the fact that the land has an enhanced value attached to it by the equipment of such cottages and the convenience afforded by having labour close at hand, must not be overlooked.

*Cost.*—The cost of erection varies in different parts of Great Britain, local circumstances being the chief governing factor. For instance, where stone, gravel, sand, &c., can be obtained on the site, it is possible to reduce the cost of building, as haulage is a serious item in many instances.

The accompanying illustrations show:—(Fig. 1) A single cottage to cost from £200–£225; (Fig. 2) a pair of cottages to cost from £300–£350; (Fig. 3) a block of three cottages to cost from £550–£600. These are applicable to any variety of site, and, in order to keep down the cost as much as possible, are simple in plan and unpretentious in design.

Experience of the erection of small houses and cottages in Hertfordshire and the Midlands within recent years shows that it is possible to build cottages of this type in a thoroughly substantial manner for between 4*d*. and 4½*d*. per cubic foot. It is very undesirable to have cottages erected which are likely to require a considerable amount of attention or outlay in repairs.

*Accommodation.*—Opinions differ on the question as to whether a parlour is necessary, but there are some tenants who would not live in a cottage were not this additional luxury provided, and in any case, if not needed as an additional sitting-room, it can be utilised as a bedroom, or the

room may be let to a lodger in order to augment the income of the family. Fig. 2, however, shows a cottage without a parlour, but with a larger living room.

With regard to bedroom accommodation, it should be the general rule to make provision for three bedrooms to labourers' cottages. Instances occasionally occur in which two bedrooms may be deemed sufficient. No bedroom should contain a floor area of less than 60 superficial feet, and the windows should be designed equal in area to not less than one-tenth of the floor space.

*The Site.*—As regards the best and healthiest soils upon which to live, gravel, compact sand, rock, or dry chalk stand first, but choice in this respect is limited by circumstances, and whatever site is ultimately decided upon, it should be ascertained that it is well drained; if not, it should be effectually drained by means of suitable earthenware field pipes. Again, where there is a free choice of aspect, it is generally considered that a south-easterly one is best, so that some protection may be afforded from the bitter north-easterly winds and the driving south-westerly rains.

*Water-supply.*—The questions of water-supply and the disposal of drainage are important preliminaries connected with modern building, and full consideration should be given to them in determining the site. The Public Health (Water) Act, 1878, requires that every rural sanitary authority (regard being had to the provisions contained in this Act) shall see that every occupied dwelling-house within their district has within a reasonable distance an available supply of wholesome water, sufficient for the consumption and use for domestic purposes of the inmates of the house.

Of course, in the majority of outlying agricultural districts the idea of obtaining water from the mains of district councils, &c., is out of the question, and unless the water-pipes can be extended from the farmstead or other dwellings near at hand which may happen to be already provided with a supply of good drinking water from springs or other sources, recourse must be had to wells, of which there are two kinds, viz., deep and shallow. Of these, deep wells are to be preferred, and in sinking them the surface water should be excluded by 10 or 12 ft. of substantial brickwork, sur-

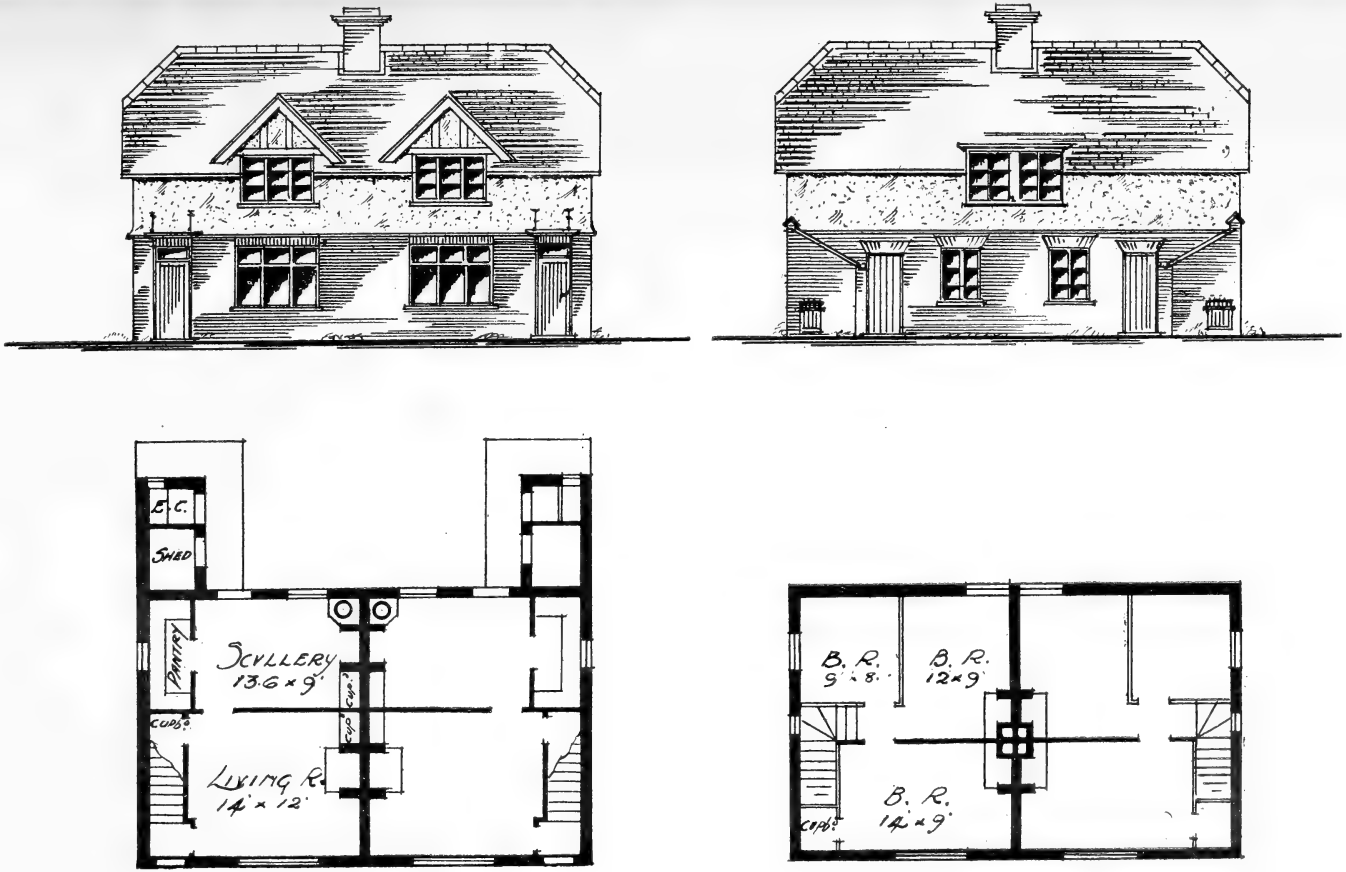



FIG. 2.—DESIGN FOR A PAIR OF COTTAGES TO COST FROM £300 TO £350.

rounded with 12 in. of clay puddle. They should never be less than 50 ft. deep, and the deeper they go the less likely is the water to be contaminated. With regard to shallow wells, it is no uncommon thing when the weather is very dry, for the water-supply to become scanty and sometimes to cease altogether. This is a proof that the water is derived from surface drainage after passing through a few feet of soil and collecting in the hollow made for it. The one great objection to shallow wells is that the water is liable to pollution to a greater degree than in deep wells. Wells, if removed from all likely sources of pollution, are better than surface streams.

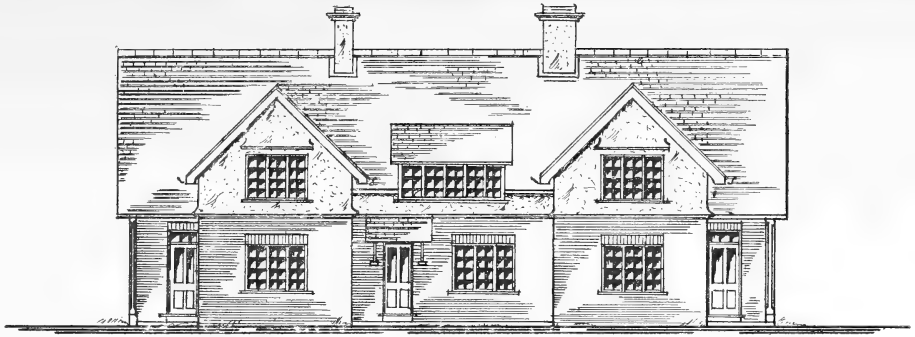
It frequently happens, more particularly in the fen districts, that the sources of water-supply already enumerated are not available, and cottagers have to depend upon the storage of the rain-water for domestic purposes, or the water is pumped and carted from the dykes and drains which are so common in that part of the country. Water from the latter sources is frequently of a brownish colour owing to the fact that it has drained through peaty land; it has been proved by analysis that it is not deleterious for drinking purposes on that account, but there are risks of its being polluted by other causes.

Rain-water collected from the roofs of houses and stored in underground tanks frequently becomes polluted, and should be boiled and efficiently filtered. The tanks should be constructed of substantial concrete or brickwork in cement, and should be rendered in cement 1 in. thick or lined with pure bitumen sheeting, and should be thoroughly cleaned out three or four times a year. On no account should tanks for the storage of rain-water be lined with lead, as the lead becomes oxidised by the action of rain-water, and persons drinking the water are liable to lead poisoning.

The frequent occurrence of wells and cesspools in close proximity, and the use in villages of surface streams, make it absolutely necessary that great care should be exercised in the use of water. Unfortunately, the provision of a suitable water-supply sometimes involves considerable expense to a landowner, a recent case in Buckinghamshire working out at 22 per cent. of the actual cost of the cottage.

*Drainage.*—In some districts it is not usual to provide sinks, and slops and other refuse are deposited direct on to the garden; but where sinks are provided or water-closets are adopted, in districts which are so sparsely populated that the provision of a suitable drainage system becomes impracticable, cesspools are permissible. They are liable, however, to become a source of nuisance and danger to health, and should be constructed at a distance of at least 50 ft. from a dwelling-house, and, with a view to the prevention of risk of water pollution, at a distance of at least 60 or 80 ft. from any well, spring, or stream of water used for drinking purposes. They should be constructed of good brickwork in cement, rendered in cement 1 in. thick, and have a dished concrete bottom also rendered in cement, with a backing of 9 in. or 12 in. of well-puddled clay; they should be domed over in cement, and finished with a hard stone cover with a ring let in, or an iron air-tight manhole cover. The drainage to cesspools should be similar in all respects to drains connected to a regular sewer: the pipes should be jointed in cement, inspection-chambers should be provided at all turning-points or junctions, and an interceptor and a ventilating inlet and outlet to each. The chief objection to cesspools is that many of them are not water-tight, and the contents escaping and permeating the surrounding soil often contaminate the sources of water-supply: hence the necessity for careful construction. Rain-water, if not required, as well as surface water, should not be conveyed to the cesspools, but taken away clear of the foundations, and either allowed to soak away or to be discharged into a ditch or watercourse.

Where earth-closets with a fixed receptacle are provided, they should be constructed at least 10 ft. from the dwelling-houses in such a manner and in such a position as to admit of the frequent and effectual application of a sufficient quantity of dry earth or ashes, and in such a position as will admit of ready access for the removal of contents. In any case, the contents should not be allowed to remain undisturbed for a period exceeding three months. The receptacle should be formed of impervious material, the floor being raised about 3 in. above the level of the surrounding ground, so that the contents may not at any time be exposed to any



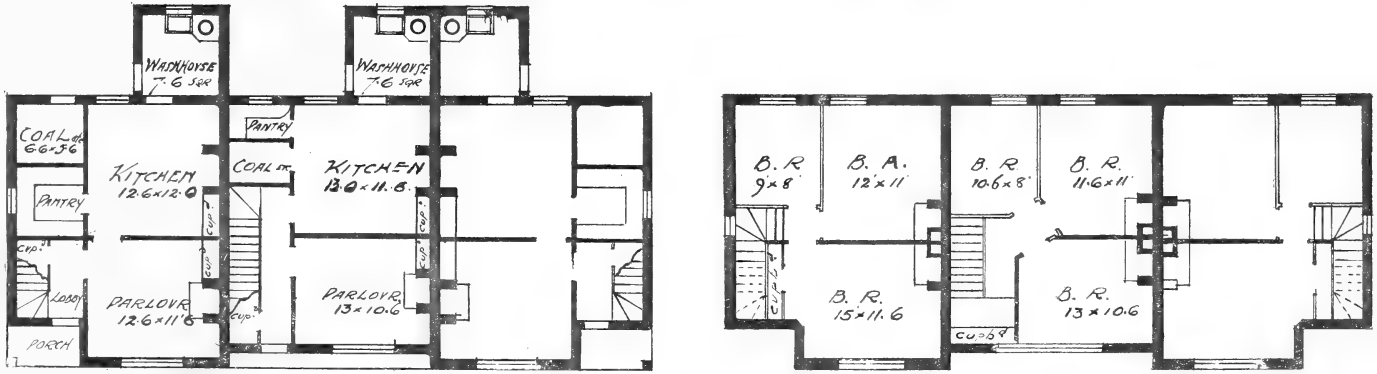



FIG. 3.—DESIGN FOR A BLOCK OF THREE COTTAGES TO COST FROM £550 TO £600.

rainfall or to the drainage of any waste water or liquid refuse.

Earth-closets with a movable receptacle, such as a galvanised pail, may be constructed in connection with a dwelling-house, but not within the same, in such a manner and position as previously described. The capacity of the movable receptable should, however, be limited in order to ensure the removal of its contents at least once a week. The seat or riser should be adjusted to admit readily of the removal of the pail. A small ledged door and frame in the back or side external wall may be provided for this purpose.

*Building Materials.*—A good deal of prominence has been given to the use of concrete blocks, and, where the site itself provides ample gravel and sand, and neither bricks nor stone can be obtained without the expense of cartage for a considerable distance, it is possible to build more cheaply in this manner. On the other hand, where bricks can be had at a moderate price, it is doubtful whether much saving can be effected by the use of these blocks. In any case, it is of paramount importance that the manufacture of concrete blocks should be carried out under skilled supervision; the quality of the cement, the proportion of the constituent parts, the mode of mixing, &c., being details requiring the greatest care in order to ensure satisfactory results.

In districts where stone is plentiful and available for building purposes, it is necessary to ascertain that its weathering qualities are such as would justify its use for this purpose. Where gravel and sand can be obtained on the site, care should be taken to see that they are free from all earthy or clayey matter before use, and that the sand is sufficiently sharp.

Bricks can still be obtained at very reasonable rates in many districts, and for general work, good, sound, hard, well-burnt bricks from approved yards should be used. For external facings they should be of uniform shape and colour, but for internal use thoroughly sound work can be obtained by the use of "Flettons," which can be procured in truck-loads at a low rate. The main objections to their use for external work are their unevenness of colour, and their liability to flake in much exposed situations, while for internal

work their somewhat smooth surface provides a poor key for plastering. The latter disadvantage may be remedied by a wash of cement and coarse sand, but the bricks can now be obtained properly grooved or keyed for plastering.

*Foundations.*—It frequently happens that the subsoil of the selected site is of a character which renders concrete under the footings necessary to a depth of 9 in. or 12 in., the object being to distribute the superincumbent weight over a greater area than would be the case were the walls built directly on the soil. If the ground be made-up ground, or uneven or variable in its strength, the concrete may also have to act as a lintel. Where the subsoil is of rock, chalk, gravel, or compact sand, footings may be unnecessary.

*Walls.*—Where walls are built of brick a thickness of 9 in. is usually prescribed for external walls. In some situations, however, particularly those on high ground and exposed to the south-west, it has been proved that a 9-in. wall will not prevent the damp from penetrating (though the quality of the bricks used may account for this in some cases), and in such circumstances hollow walls may be adopted.

Hollow or cavity walls serve two useful purposes: first, to preserve a more uniform temperature inside the building; and secondly, to prevent dampness extending from without to the interior of the building. The cavity between the walls should not exceed $2\frac{1}{2}$ in., and should in all cases commence from the damp course. Iron ties should be either galvanised or tarred and sanded, and inserted at least three to every superficial yard, and these not directly over one another, but midway between those immediately beneath them. The heads of all doors and window openings should be protected by means of strips of lead or zinc from any moisture that may drain upon them, and should extend 2 in. beyond the ends of the woodwork.

Although the useful purposes served by hollow walls are obvious, what are known as 11-in. hollow walls are not to be recommended, as they involve a sacrifice of strength and stability as compared with a 9-in. solid brick wall well and properly built in English or Flemish bond. Opinions may differ on this point, but it seems obvious that two detached $4\frac{1}{2}$-in. walls, with no additional bond beyond that of three

iron ties to each superficial yard, must be the weaker of the two. To ensure sound work, not less than 16 in. cavity walls should be constructed—at any rate, up to the first floor level. As an alternative, if 11 in. cavity walls are used, the brickwork should be built in stretcher bond in either blue lias lime or Portland cement mortar, and the roof plate bedded on the inner $4\frac{1}{2}$ in. wall. Additional strength might be obtained by inserting a band of hoop iron at about every 2 ft. 6 in. or 3 ft. in height, well tarred and sanded. In either case, the cost would be increased, but the weight and thrust of the floors and roof on the walls are important factors to be taken into consideration with regard to 11 in. walls.

*Chimneys and Fireplaces.*—Expense is saved by forming the fireplaces on internal walls and grouping the flues into one stack. The chimney will be less likely to smoke, and the rooms should benefit by the warmth of the flues. There will also be less cutting and trimming to the roof. It is better to provide fireplaces to all bedrooms, as, apart from the convenience in cases of illness, there is no better ventilator than a fireplace. Where, however, this cannot be done, a suitable ventilator, or air brick, not less than 9 in. by 6 in., should be fixed in an external wall. One sometimes encounters people who still cling to the foolish prejudice against fresh air, and it is no uncommon thing to find these people closing the register stove-flaps or covering up the ventilators in their bedrooms.

*Floors.*—In many existing cottages, one frequently finds the whole of the rooms on the ground floor either cement or quarry paved. It is preferable that the living rooms, at any rate, should have boarded floors on account of the extra comfort and warmth derived from them. Wood block floors laid in mastic on a bed of concrete, and ordinary flooring boards laid in mastic and nailed to a breeze concrete bed, are sometimes adopted, but where board and joist floors are provided, it is important to keep a clear space of 12 in. between such floors and the ground. Sleeper walls should have openings left in them, and the external walls should have sufficient air-bricks built in to ensure ample ventilation.

*Windows and Doors.*—Casement windows seem to be

more adapted to cottages than double-hung sashes. They have, however, disadvantages compared with the latter owing to the difficulties experienced in regulating ventilation without draughts, in keeping them water-tight, and in cleaning the outside from within.

By fixing the windows flush, or nearly so, with the external face of the wall, wide window-boards can be provided, which are generally found very useful, and are greatly appreciated by the labourers' wives.

A height of 8 ft. or 8 ft. 6 in. to the rooms should be ample, and it should be borne in mind that it is not so much the height of a room which makes it conducive to health as effective ventilation. The door should act as an inlet and the window as an outlet, and for this purpose the window-opening should extend as nearly as possible to the ceiling.

Ledged doors would be in keeping with cottage architecture, but if panelled doors are provided, they should not be less than $1\frac{1}{2}$ in. in thickness, owing to the liability of thin doors to twist. All fireplaces, windows, and doors should be arranged with a due regard to convenience, so as to provide ventilation with an absence of draught.

*Staircases.*—Stairs should be conveniently planned and well lighted. Ample headroom should be provided, a point in construction which is frequently overlooked. It is desirable to allow 6 ft. 9 in. to 7 ft. measured vertically. The width of stairs should not be less than 2 ft. 8 in. to 3 ft. A feature in planning, also, should be to make the "going" as easy as possible, and to effect this the treads should be 9 in. wide, and the rise from step to step 7 in. to $7\frac{1}{2}$ in., but not exceeding the latter. Winders should be avoided as much as possible.

*Pantry.*—A suitable pantry should be provided to each cottage, and so arranged that one, at least, of its walls is external, in which a window can be provided for affording light and ventilation.

*Scullery, &c.*—A copper, either portable or built in the usual manner, should be provided for washing purposes in the scullery or in an outbuilding. By the use, at a trifling cost, of one or other of the patent steam exhausts, a good

deal of the steam can be disposed of without it penetrating the rooms when the copper is inside the building.

Provision should be made for storing some of the roof water for general washing purposes, either by tanks or wooden butts well tarred or pitched.

The yards, walks, &c., should be paved, either with cement, concrete, or hard bricks, or gravelled.

*Damp-course.*—There are several materials in general use as damp-proof courses. Of these, a double course of stout slates in cement 6 in. above the level of the surrounding ground and laid to break joint, is the one most commonly used, and is found to be very efficient. In certain districts, particularly in the Midlands, two courses of blue Staffordshire bricks in cement are used, and if the two courses of brickwork above and below them are set in cement mortar, an equally satisfactory result is obtained. Asphalte, as generally understood, is a mixture of bitumen and tar, and is proof against damp rising, but it is liable to squeeze out under pressure of heavy buildings in very hot weather. There are certain makes of bitumen sheeting which prove effective for damp courses. On no account should asphalted or tarred felt be used. It is cheap and is used largely in speculative work, but it is inefficient as a damp-proof course, and soon perishes. Its use should therefore be discouraged.

*Sills.*—With regard to window-sills, stone is mostly used; slate is also employed in certain districts. Croft granite stone for sills, steps, &c., has also proved satisfactory. It weathers well, and the cost is about one-half that of ordinary stone. Two courses of quarry tiles, set sloping and well bedded and pointed in cement, are also cheap and efficient. Then there are purpose-made sill bricks, but those of Staffordshire make are to be preferred. Cemented brick-on-edge-in-cement sills are frequently adopted, but unless the cement is of the best quality and the work well performed, they are liable to crack and disintegrate.

*Tiles and Slates.*—Tiles and slates form the chief coverings for roofs. Of the former, plain sand-faced tiles and the the Broseley or similar nib tiles are the best. Pan tiles form a cheaper covering, and are sometimes used, but they are not a desirable covering for roofs of dwelling-houses. Tiles

of ornamental pattern are sometimes used, but the question of expense usually prohibits their use for cottages. A tiled roof should have a pitch of not less than 40°. Ordinary slates are a cheaper form of roof covering than tiles, but should not be laid to a less pitch than 30°.

There are also several artificial substitutes on the market in place of tiles and slates. The asbestos-cement slates seem to be rapidly rising in favour in some parts of the country, but it has yet to be proved that they are as durable as good Welsh slate. The advantages claimed for them are that they are light, weather-proof, non-conducting, and economical, the cost being stated to be less than one-half that of Broseley tiling. The rafters are usually spaced 2 ft. apart, thus effecting a saving in the timber as compared with the spacing for ordinary slates.

This article has been devoted to the general treatment of the subject, and has aimed at setting forth the main principles on which unpretentious but useful cottages can be provided for labourers at a reasonable cost, without sacrificing comfort or durability. The accompanying designs will serve to illustrate how such cottages can be erected, at the prices stated, to meet the present-day needs of agricultural labourers.

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## SWIFT MOTHS (*Hepialidae*).

R. STEWART MACDOUGALL, M.A., D.Sc.

THE *Hepialidae* are an isolated family of moths showing some primitive characters. There are five British species. Three of these feed—in the caterpillar stage—on and in the roots and rhizomes of the bracken fern (*Pteris aquilina*). The two troublesome species are the Small Garden Swift Moth (*Hepialus lupulinus,* L.) and the Ghost Swift (*Hepialus humuli,* L.). The caterpillars feed underground.

*Hepialus lupulinus.*—The caterpillars of this moth are very destructive; their food plants belong to many Natural Orders. In the past three years the caterpillars have been reported to the Board as damaging—often severely—the underground parts of daffodils (the bulbs especially), peonies, dahlias,

chrysanthemums, and lily-of-the-valley. In the literature there is a long list of host-plants :—grasses, oats, snowdrop, colchicum, gladiolus, lily, peas, beans, strawberries, raspberries, parsnip, celery, parsley, potatoes, horehound, white and purple dead nettles, phlox, *Chelone barbata,* lettuce, auriculas, and dock.

*Description.—Moth :* The moth varies in colour and in size. In spread of wing the measurement is from 1 inch to 1½ inch. The male has the thorax and abdomen yellow-brown. The front wings are brown—sometimes lighter, sometimes darker —with a white stripe that runs from the middle of the base of the wing, and parallel for a short distance with the hind edge of the wing, when it then suddenly bends and runs obliquely across the wing to near the apex. About the middle of each fore-wing is a white spot or dash. The hind-wings are purple-brown or smoke-coloured, with pale brown fringes. The female moth has the same general colour as the male; the markings, however, are not so distinct, and may be absent. Antennæ and legs are short in both sexes.

*Larva :* The caterpillar has sixteen legs, and measures four-fifths of an inch when full grown. It is whitish or yellowish-white in colour; the head is brown, as is also the plate or shield on the upper surface of the joint behind the head. The other segments of the body show dark or light dots on their upper surface, and each dot carries a stiff black hair; the spiracles are black.

*Pupa :* The pupa is shining red or pale brown, with the head and wing cases darker. The segments of the abdomen are markedly divided off from one another; five of them have horny ridges with projecting teeth on their upper surface, and four of them have similar spines on the under surface. The pupa is enclosed in a delicate cocoon; within this cocoon the pupa, on being touched, wriggles violently. Before the adult moth issues the pupa presses itself out of the cocoon and above the surface of the soil so as to allow of emergence of the moth.

*Life History.*—The moths are found in May and June, but stragglers may be found later. They appear about dusk. The male is a very active flier; the female is more restful, hanging to some grass or other stem, and attracting the male by a

rapid vibration of her wings. After pairing, the female flies among herbage and drops her eggs as she flies. The caterpillars live underground, and feed from late June on through July and to the next April or May, *i.e.*, they remain in the caterpillar stage all the winter, feeding more or less continuously in open winters, and going a little deeper, during frost, for protection. Pupation of the full-fed caterpillar takes place at the end of April, in May, and in June.

*Hepialus lupulinus* is common over England and Wales, but not so common in Scotland, although it has been taken as far north as the Orkneys; it is also found in Ireland.

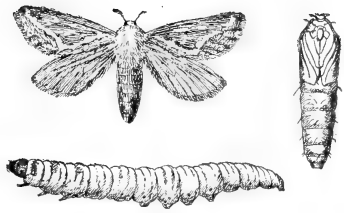
*Hepialus humuli.*—The caterpillars of this moth are also troublesome enemies. A correspondent of the Board who sent one of the caterpillars taken from a carrot tunnelled by it, wrote that the caterpillars had been very destructive to this crop, and that frequently he dug them up with the spade whilst digging a new plot. Curtis in 1848 recorded a similar attack on a carrot, the caterpillar being found in "a cavity 2 or 3 inches long." Theobald and others have recorded this caterpillar as destructive to the roots of hops; on the Continent it is a proved enemy of hops, tunnelling in the roots. Carpenter has recorded the caterpillar as attacking potatoes and the roots of oats in Roscommon. Barrett gives as food-plants dandelion, dead-nettle, Jerusalem artichoke, and asparagus. It feeds also at the roots of burdock, nettle, and dock.

The Ghost Moth is common in Britain from north to south, and in Ireland.

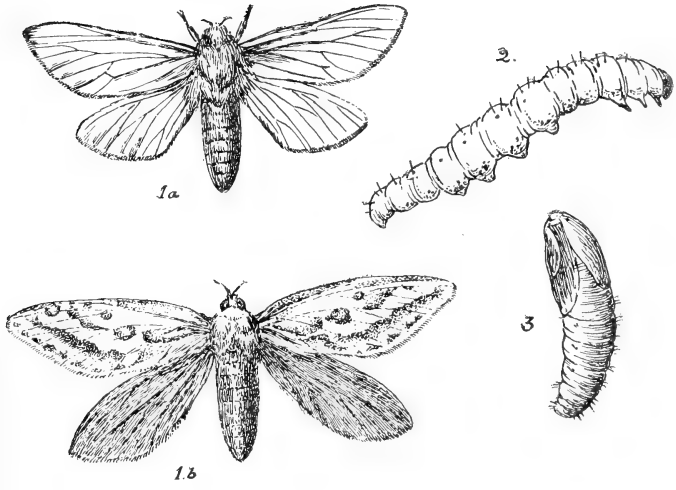
*Description.—Moth:* The moth measures from $1\frac{1}{2}$ to $2\frac{3}{4}$ inches in spread of wings. There is a marked colour difference between the male and the female. All the four wings of the male are usually silvery-white, but the hind wings may be greyish. The fore-wings of the female are broader and are yellow, with orange or brown-red markings; the hind wings of the female are greyish, and tinged with red at the apex. The female varies somewhat in colour, and there is in Shetland a variety in which the colour of the male approaches that of the female.

*Egg:* The eggs are small and round. Barrett describes them as greenish when first laid, but becoming black.

*Larva:* The caterpillar measures $1\frac{1}{2}$ inches when full



SMALL GARDEN SWIFT MOTH (*Hepialus lupulinus*).
(Natural size.)




GHOST SWIFT MOTH (*Hepialus humuli*).
1*a*, Male; 1*b*, female; 2, caterpillar; 3, pupa.
(All natural size.)

grown; in colour it is whitish or pinkish-white, with the spiracles black. The head is red-brown, as is also the dorsal plate on the joint behind the head; there are black or dark-brown dots on the upper surface of the segments of the body, with black hairs.

*Pupa:* The colour of the pupa is dark chestnut; the upper surface of the abdominal joints shows a number of dark brown points, and there are black teeth on the under surface; the last segment has marked black points. The pupa is enclosed in a slight cocoon, and lies in the soil quite near the surface.

*Life History.*—The moths fly in June and July. The courtship of this species has been described by Chapman.

The moths fly in the gloaming. The male, ghost-like and conspicuous by the silvery white colour in spite of the dusk, chooses a place and hovers for a short time backwards and forwards, "swaying like a pendulum over a surface of about a yard" (Barrett) in order to attract the female. Sometimes the male is alone, sometimes there are several males in company. The female, non-fertilised, flies towards a male and intentionally touches or knocks up against the male, which at once ceases its swaying and drops to the ground, where pairing takes place. The fertilised female flies about over the grass, discharging her eggs as she flies. From the egg hatches the caterpillar, which feeds from July till the next April or May at least, when pupation takes place. As with the last species, the pupa leaves the cocoon just before the emergence of the moth, and by means of its spines wriggles to the surface.

*Treatment.*—Vaporite has been used with some success against swift caterpillars.

Pieces of potato tuber placed here and there some inches below the surface of the soil, in marked places, will serve as traps.

The working of the soil where the crop allows, and the turning up of the caterpillars to the birds is a useful measure, or the caterpillars can be collected.

In some cases, *e.g.*, with daffodils, should the pest be abundant, the bulbs should be lifted and replanted. There are disadvantages to this course, but in some cases the

measure will be practicable. In a confined area where the caterpillars are at work the use of bisulphide of carbon injected into the soil would destroy them.

In addition to birds, there is help from nature from moles and from two species of parasitic fungi, viz., *Cordyceps militaris* and *Cordyceps entomorrhiza*.

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**The Administration of the Small Holdings Act in 1910.**

THE Report of the Small Holdings Commissioners on the administration of the Small Holdings Act during the year 1910 has recently been issued [Cd. 5615. Price $3\frac{1}{2}d$.]

Considerable progress has been made during the past year in satisfying the demand for small holdings, and the position on the 31st December last was that 89,253 acres had been actually acquired or agreed to be acquired for small holdings by County Councils in England and Wales, of which 53,642 acres had been purchased for £1,695,836, and 35,611 acres leased for rents amounting to £44,489. Of this land 65,923 acres had been actually let to 4,846 individual small holders, and 52 acres sold to seven small holders. In addition 3,454 acres had been let to 27 Co-operative Small Holdings Associations, who had sublet the land to 490 of their members, and 2,192 applicants had been provided with 27,000 acres by private landowners direct, mainly through the instrumentality of the Councils. The land which has been acquired but not yet allotted will probably provide for another 1,500 applicants, and it will therefore be seen that the Act has resulted in the provision of land for approximately 9,035 applicants in three years.

During 1910 fresh applications were received by County Councils from 4,003 individuals and seven Associations for 70,253 acres, bringing the total number of applicants since the Act came into operation up to 30,886 and 34 Associations, and the total quantity of land applied for up to 507,377 acres. Of these applicants 17,595 had been provisionally approved for 256,134 acres up to the end of 1910. From returns supplied by County Councils the number of applicants remaining on the Council's books for whom land had not been acquired or

agreed to be acquired was 8,168 and seven Associations, and the quantity they require is 127,256 acres, but it seems clear that these figures are considerably in excess of the genuine outstanding demand. It has been found that a considerable number of the applicants who had been provisionally approved in the first instance are inclined to withdraw when a definite offer of land is made to them, and others on further investigation have had to be rejected as unsuitable. As was pointed out in the previous report, the problem before the Councils has been to fit particular men to particular land, and very few of the applicants are willing to move from their immediate neighbourhood. In many cases also the rents which Councils are bound to ask to recoup their outlay on the acquisition and adaptation of the land are higher than the applicants expected or are willing to pay, and many applications have been withdrawn on this account. A considerable number of applicants have obtained holdings from private landowners.

After discussing the action taken in different districts, and other matters arising in connection with the Acts, the Small Holdings Commissioners observe that: "The provision of over 9,000 small holdings through the instrumentality of the Act in three years is a result which reflects great credit on the various Councils concerned. With very few exceptions they have lost no opportunity of providing for the needs of all suitable applicants, and we are satisfied that in the great majority of counties the work could not have been done more quickly without serious risk of disaster. The truth is that the demand for small holdings has been so large that it would have been impossible to have satisfied the whole of it in two or three years, and in view of the fact that negotiations for the acquisition of land necessarily occupy a considerable time that a great deal of land which could have been acquired is either unsuitable or too expensive, and that as a rule the land has had to be acquired in those localities where there is most competition for it, the results achieved cannot be regarded as anything but satisfactory. It is inevitable that some of the applicants should consider that there has been unreasonable delay, but that this is in most cases not the fault of the Councils is shown by the fact that in those counties where

the Act has been vigorously administered ever since it came into operation, such as Norfolk, Somerset, and Cambridge, the unsatisfied demand from suitable applicants still remains a very large one, even after three years' hard work. In Norfolk 3,610 acres are still required for 316 applicants, in Somerset 11,588 acres for 873 applicants, and in Cambridge 6,510 acres for 513 applicants.

"The Board are bound to see not only that the reasonable demands of suitable applicants are satisfied with as little delay as possible, but also that the Act is administered in such a way that the interests of sitting tenants are not unjustly affected. If there had been any ruthless disturbance of sitting tenants it would have aroused such a storm of indignation that the success of the whole movement would have been jeopardised, while if unsuitable men had been placed on the land it would inevitably have resulted in a considerable charge being thrown on the rates. If the small holdings movement is to be the permanent success for which we hope, it is essential that it should be carried out with the hearty co-operation of all classes connected with the land, and with the minimum amount of friction and hardship."

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**Changes in the Number of Small Holdings.**

THE Report referred to above shows that considerable progress is being made in the provision of small holdings in England and Wales, but owing to the annual transfer of a substantial area of land from agriculture to other purposes there is at the same time a movement in the contrary direction which prevents the net increase in the number of small holdings from being as great as it would otherwise be. This point is discussed at some length in the Report on the Acreage and Live Stock Returns for 1910 (Cd. 5585. Price 5½*d*.).

The changes which have taken place since 1890 in the number of holdings exceeding one acre and not exceeding 50 acres are shown in Table A on the next page.

During the two years 1908 to 1910 the net addition of holdings of this size was 1,482 in England and 144 in Wales, making a total of 1,626. This represents a striking change in the tendency which these returns had previously exhibited.

From 1903 to 1908 the number of small holdings in England and Wales diminished by 3,495. Prior to 1903 the latest available figures as to holdings of different sizes are those resulting from a special inquiry in 1895, and from 1895 to 1908 the loss of small holdings in England and Wales amounted to no less

TABLE A.

| Year. | England. | Wales. | Total of England and Wales. |
|---|---|---|---|
| 1890* ... ... ... | 267,346 | 41,944 | 309,290 |
| 1895 ... ... ... | 257,646 | 41,732 | 299,378 |
| 1903 ... ... ... | 248,936 | 41,735 | 290,671 |
| 1904 ... ... ... | 248,104 | 41,895 | 289,999 |
| 1905 ... ... ... | 247,854 | 42,013 | 289,867 |
| 1906 ... ... ... | 246,934 | 41,992 | 288,926 |
| 1907 ... ... ... | 246,896 | 42,197 | 289,093 |
| 1908 ... ... ... | 245,102 | 42,074 | 287,176 |
| 1909 ... ... ... | 245,856 | 42,155 | 288,011 |
| 1910 ... ... ... | 246,584 | 42,218 | 288,802 |

* The holdings of one acre have been deducted in the proportion ascertained in 1895.

than 12,202. At the previous inquiry in 1890 holdings of precisely one acre were included, whereas in later years they were excluded, so that an exact comparison is not possible. An estimated number of such holdings has, however, been deducted from the total of 1890, so as to obtain a comparable figure, and on this basis the loss of small holdings between 1890 and 1895 was 9,912. It may be calculated, therefore, that during the 18 years 1890 to 1908 the reduction in the number of small holdings amounted to 22,000.

The addition, therefore, of 1,626 in the two years 1908 to 1910 affords evidence of a strong counteracting influence to the previous tendency.

The figures in these returns record the net result at the end of the year of the changes which have taken place, from various causes and in opposite directions, during the preceding twelve months. This is especially the case in regard to the number of holdings. It is evident that by the contraction of the cultivated area—the acreage under crops and grass—a considerable number of farms must disappear every year, absorbed for the most part by the unrelenting growth of the urban districts. This process of absorption probably affects the number of small holdings to a greater extent than those

of larger holdings, partly by reason of the fact that small holdings tend to cluster around towns, and are therefore more immediately within the sphere of urban encroachment, and partly because the absorption of an equal area may involve numerous small holdings, or only one large holding. It is clear, therefore, that the creation of a very considerable number of new small holdings must be represented when the balance of gains and losses in this class shows a net addition in two years of 1,626.

As the number of small holdings provided under the Act in 1908 and 1909, according to the particulars furnished to the Board by the local authorities, was 4,443, it seemed desirable to ascertain whether the net increase in this class of holdings, as shown in these returns, fully represented the results of the movement known to have taken place. Special inquiries were accordingly made in certain counties where the returns appeared to be somewhat inconsistent, and a considerable amount of detailed information was obtained. It was found, as was anticipated, that in many cases the creation of small holdings in one district was accompanied by their absorption in another district. This absorption was mainly for building purposes, but in some cases the few acres of the small holder were taken into a larger farm. The ambition and success of the small holder himself was found to be the cause in some instances of the disappearance of an adjoining holding, which at the first opportunity he had acquired, so as to increase his own occupation, while still remaining a small holder. Of those provided with holdings under the Act a considerable proportion had previously occupied small parcels of land which, if above an acre, would have been reckoned as small holdings. In fact, the replacement on the land of small holders displaced by the process of absorption already referred to is evidently one of the satisfactory results achieved under the Act. In one county, out of 194 small holdings provided, 123 were taken by persons who had previously occupied land. In another county, in the same year in which 59 small holdings were provided under the Act, 12 small holdings, comprising in the aggregate 27 acres, were consolidated into one small holding. Again, near a large town it was found that a number of holdings above one acre but less than 50

acres had been formed into allotments, *i.e.*, occupations of less than one acre, and would thus cease to be included in the agricultural returns, the change being recorded as a decrease of small holdings. In another county it was found that a considerable number of holdings had been taken by associations, and that the association and not the individual holders, had been reckoned as the occupier for the agricultural returns. In some cases plots of land returned as separate holdings provided under the Act did not exceed one acre, and would therefore not be included as holdings in these returns.

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**The Paris Fat Stock Show of 1911.**

THE Annual Fat Stock Show at Paris was held this year from the 23rd to 27th February, in the Grand Palais des Champs-Elysées, the show of breeding stock which used to be held in conjunction with it being now held separately in June. A member of the staff of the Board of Agriculture and Fisheries attended this Show, and some extracts from his report are given below.

*Entries.*—The entries were :—Cattle, 223 head; sheep (pens of 3), 115 pens; sheep (groups of 15), 11 groups; pigs (single animals), 59 head; pigs (groups of 3), 19 groups. For the purpose of comparison it may be noted that the entries for the Smithfield Club Show in 1910, excluding those entered for the carcass competitions, were 289 head of cattle, 170 pens of three sheep, and 117 pairs and 36 single pigs.

Although there are said to be forty varieties of French cattle, only fifteen breeds were met with at the Show. These were the Charolais, Nivernais, Normand, Limousin, Garonnais, de Salers, Bazadais, Parthenais, Marchois, Gascon, Bourbonnais, Basquais, Breton, de St. Girons, and Cotentin, while in addition several crosses were exhibited.

The Prix d'Honneur for the best ox in the Show was awarded to a three-year-old Nivernais, which weighed 20 cwt. 1 qr. 22 lb. The Prix d'Honneur for the best cow fell to a three-year-old Charolais, which weighed 18 cwt. 1 qr. 24 lb. The Prix d'Honneur for the best group of bullocks without distinction of age or race was taken by four Charolais animals. These three championships all fell to one exhibitor, MM.

Dodat frères, and included only the Nivernais and Charolais breeds.

*Charolais Breed.*—The Charolais is a handsome white animal, which stands in the front rank of French cattle for value and importance. This race originated in the district of Brionnais, in the province of Charolais, and is found to-day throughout the centre of France. The early breeders of this race very carefully prevented the introduction of foreign blood, but subsequently breeders in the Nivernais district introduced the Shorthorn, and as a result of judicious crossing with that breed produced a variety called the Nivernais or Charolais-Nivernais, which possesses several marked improvements on the original stock. In order to retain the almost pure white colour that is a characteristic of the Charolais, the greatest care has to be taken in selecting the Shorthorn for this cross. Not only must the beast itself be of a pure white colour, but it must come of a pure white stock, or signs of reversion to type would appear in the offspring.

The Charolais-Nivernais grows to a large size, and is the finest breed in France for work and beef. The cows are, however, poor milkers, and in most cases can do no more than feed their young. In the districts where the beet sugar industry is extensively followed this breed is very prominent. The animals are of great service in preparing the land, and they fatten well on the pulp of the beetroot. The bulls sell at the shows held in February at prices varying from £20 to £48, and up to £80.

Several interesting specimens of Shorthorn-Charolais and Shorthorn-Nivernais crosses were to be seen at the Show. The ameliorating effect of the Shorthorn is very strongly marked in the improvement of the flesh-making parts and the lessening of the waste portions. It would appear that the gain in these respects is of considerably greater value than the small loss of labouring power which is said to result from these crosses. It would be interesting to see the result of a cross between the Charolais and an Aberdeen-Angus.

*The Normand Breed.*—The Normand breed, which is the dual purpose animal of France, sometimes reaches an enormous weight, but is of slow growth, being five or six years old before being fit for the butcher. Animals have been

known to exceed 35 cwt., but the weight of the 1st prize Normand at the Paris Show was only 19 cwt. at 3 years 3 months.

The most notable characteristic of this breed is, however, its milking quality. A good cow will yield nearly 750 gallons of milk per annum, and has been known to give nearly 10 gallons a day at the height of its lactation period. A yield of 35 pints a day is not rare. The average proportion of butter contained in the milk is 5·62 per cent. The prevailing colour is brindled, red and white.

*The Limousin Breed.*—The Limousin, the principal centre for which is Haute Vienne, probably ranks next in importance amongst French cattle. This breed is of a smaller build than either the Charolais or the Normand, but its formation is more stylish. It has a well-proportioned head, a long straight back, and short, well-covered legs. The colouring is very regular, being a light brown, broken only by a pinkish muzzle and a pinkish rim round the eyes. The Limousin is regarded as a fine beef producer, it fattens well, and its flesh is in great demand in the French markets. It is also a good working animal. As a milk producer it is but very ordinary, although attention is now being paid to a careful selection of animals with a view to improving its milking qualities. The winner of the first prize in the class for this breed at the Show weighed 16 cwt. 2 qr. at $3\frac{1}{2}$ years.

*The Garonnais Breed.*—The Garonnais is very similar in formation and colouring to the Limousin, but the development of muscle is rather more marked. This points to a greater aptitude to work than to provide flesh for the butcher. As its name implies, it is bred in the Garonne district between Toulouse and Bordeaux. There are two varieties of this breed, the one met with in the valley of the Garonne being a larger and more valuable animal than that of the higher plains and hills. The cows are very poor milkers. The weight of the first prize animal at the Show was 19 cwt. 6 lb. at 4 years of age.

*The Salers Breed.*—The Salers breed is noteworthy inasmuch as it combines probably more than any other French breed the three qualities—production of milk and flesh and suitability for labour. The home of this breed is in the

department of Cantal, and it is found on the volcanic but fertile plains of the Haute-Auvergne. The formation is strikingly regular, a characteristic being the large up-turned horns. The colour is an even dark red. The bullocks are good workers, and their flesh is highly esteemed by restaurateurs on account of its good flavour. The cows give an average of 32 to 35 pints of milk a day. It is from this milk that the Cantal cheese is made. The first prize animal weighed 18 cwt. 8 lb. at $3\frac{1}{2}$ years of age.

*Other Breeds of Cattle.*—The Bazadais has a similar conformation to that of the Garonnais, but the colour is darker. It is greatly valued in the south-west of France for its working qualities. It fattens well, and the flesh is highly esteemed. The first prize beast weighed 16 cwt. 2 qr. 22 lb. at 4 years of age.

Of the other French breeds to be seen at the Paris Show mention may be made of the Breton, which is somewhat similar to the Kerry. The principal characteristic of the Breton is the quality of its milk. The cows yield from 10 to 20 pints a day, but a pound of butter is obtained from $17\frac{1}{2}$, and in some cases from 13, pints of this milk.

Of the four animals entered in the class for Durham, or Shorthorns, the beast securing the first prize was a moderately fine specimen weighing 19 cwt. at 3 years of age.

The heaviest beast in the Show was an unnamed cross—probably a Charolais-Durham, weighing over 24 cwt. at 4 years of age.

*Sheep.*—The most striking point in the sheep section of the Show was the prominent part taken by breeds of English origin and of French sheep that have been improved by crossing with English breeds. The Prix d'Honneur for "the best pen of three sheep of foreign breeds or crosses between foreign and French breeds" was secured by Southdowns, which weighed 4 cwt. 3 lb. at 11 months. The Southdown was introduced into France in 1855. The Comte de Bouille was one of the first French breeders to create a flock of this breed for improving some of the French races, notably the Berrichon. The name of M. Nouette-Delorme is also connected with the establishment of the breed in France.

This breeder is said to have created the finest flock of Southdowns in France, and has done much to establish the breed in the favour of his compatriots. The champion pen of Southdowns at the Show was exhibited by MM. Dodat frères, the breeders who secured all the championships in the cattle classes. The Prix d'Honneur for "the best group of fifteen animals" was also secured by the Southdowns, these being exhibited by M. Thome. These sheep weighed 14 cwt. 2 qr. 16 lb. at 10½ months. The other Prix d'Honneur for "the best sheep entered in the class for French breeds" went to a pen of three Charmois, which weighed 3 cwt. 2 qr. 11 lb. at 11 months.

The Charmois is a most interesting breed of sheep. It is probably the best mutton-producer of all the French sheep, and it is a triumph of the breeder's art. The credit of its origin is due to M. Malingie, who fixed the type after a long and expensive series of cross-breeding experiments at his farm, La Charmoise, in Loir-et-Cher. The Charmois is the outcome of a cross of the Mérino, the Tourangeau, the Solognot, and the Berrichon with the "New Kent" breed. It is half English, inasmuch as it is formed of an eighth of the blood of each of the four breeds mentioned above with four-eighths of the "New Kent" blood. The symmetry of this breed is excellent; it has a small head, and a broad and compact body with shortish legs, well covered with mutton. It is noted for its precocity and its capacity for producing good mutton. It is able to adapt itself to flat or mountainous country, and is consequently found in every part of France, in Algeria, in the Congo, in Argentina, and in Roumania.

Another breed of English origin, the Leicester, or Dishley, as it is called, is much appreciated in France for crossing with native breeds; in fact, there is considerable argument between the votaries of the Dishley and those of the Southdown as to which breed is the better for grading-up purposes.

The examples of some of these crosses to be seen at the Paris Show included crosses of the Dishley with the Limousin, the Charmois, the Mérino-Charmois, the Mérino-Berrichon, and the Berrichon, and of the Southdown with the Berrichon, the Limousin, and the Bizet.

A Dishley-Berrichon and a Southdown-Berrichon secured

the first prize in their respective classes of long- and short-woolled crosses. The former weighed 3 cwt. 1 qr. 25 lb. at 12½ months, and the latter 2 cwt. 3 qr. 13 lb. at 11½ months, whereas the Southdown-Berrichon that was awarded the second prize in the short-woolled cross weighed 3 cwt. 2 qr. 19 lb. at 12 months.

These specimens did not enable a distinction to be drawn between the merits of these two crosses, but it would appear that the Berrichon is the best amongst the French breeds for crossing with either of the English ones.

An interesting cross was that of the Southdown-Bizet, in which the improvement of the native breed was decidedly marked. The Dishley-Mérino also showed a striking improvement on the famous wool-producing breed. There was a small class of pure Mérinos, and although much has been done in France to improve the flesh production of this breed, it still looks somewhat out of place at a fat stock show. This is, in fact, true, judging from an English standard, of most of the other breeds exhibited: the Berrichon, the Lauraguais, the race of the Pyrenees, the Bizet, the Montagne-Noire, and the Lacaune. They all have large heads, narrow backs, long legs, and a poor covering of flesh, and, judging from the small patch that it is customary to leave on either flank of an animal exhibited on the Continent, the wool is not nearly good enough to make up for these deficiencies. Some of the breeds, such as the Lauraguais, are kept primarily for milk.

It is perhaps unfair to judge the French breeds by the English standard, as in France neither the system of cultivation nor of land tenure are conducive to the rearing of a similar class of sheep to those found in this country, added to which there is a comparatively small demand for mutton. The demand for mutton could, no doubt, be increased by a general improvement in the class of meat placed on the market, and this could, perhaps, best be done by a more general use of English breeds for grading-up the native animals.

*Pigs*.—The pigs were mostly Craonnais and Normands, with a number of crosses between these breeds, and a few Yorkshires. The Prix d'Honneur for the best pig was

awarded to a Craonnais, aged 12 months, which weighed 6 cwt. 3 qr. 3 lb. This heavy weight, of course, meant an enormous quantity of fat, but the breed as a whole has an excellent reputation. It claims with the Normand a strong tendency to produce more flesh than fat.

The Yorkshire is now fully adopted by the French breeder, who claims that his animals may be compared to their advantage with the breed in this country. The early maturity of the Yorkshire strongly appeals to him, as he is able to rear and prepare for the butcher three lots of this breed in the same time as it would take to bring two Craonnais or Normands to perfection. The first prize in a class for foreign breeds was a Yorkshire weighing 4 cwt. 2 qr. 17 lb. at 11½ months.

*Poultry*.—In the poultry section, which included some eleven hundred lots of exhibits, the prize for the best birds in the French classes was awarded to a pair of La Flèche birds, and that for the best in the foreign classes to a golden game-cock and two hens exhibited by M. Pichot, of Paris.

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**Indian Wheat.**

A PAPER on "Indian Wheat for the British Market," by Sir James Wilson, recently published by the Government of India, contains matter of much interest to agriculturists in this country. The most remarkable fact in connection with Indian wheat is that it fetches on the average three shillings more per quarter in the English market than home-grown wheat, in spite of the fact that it contains a higher proportion of impurities, and is less uniform in quality. It is well known that Canadian wheat also commands a higher price than British grown, but in this case the difference is apparently due to the superiority of the former in providing a flour of better baking quality: in the phraseology of the trade Canadian wheat is "stronger" than British.

The annual imports of wheat and flour from abroad average 114 million cwt., to which the principal contributors are: United States, 27 per cent.; Argentine Republic, 19 per cent.; India and Russia, 14 per cent.; Canada, 12 per cent. India has not always occupied such a high position. The gradual diminution of the supplies from the United States, and the

absence of drought in India during the last decade have tended to stimulate the exports from the latter country. There is a very general impression that the staple food of the natives of India is rice, but it is evident from Sir James Wilson's figures that only one eighth of the total produce of wheat is exported, and that no less than seven million tons are retained for home consumption. It is estimated that the average out-turn per acre is 11½ bushels; but in comparing this figure with that for the United Kingdom—31 bushels per acre—it must be remembered that much of the wheat produced in India is grown without irrigation during the "dry" months, a season which is co-extensive with the whole period of growth—October to March. On irrigated lands, the average out-turn is probably not less than 15 bushels per acre, a remarkable figure if it be borne in mind that very little farmyard manure and no artificial fertilisers are used by the Indian cultivator. Most of the former is used for fuel, while the cost of the latter places it beyond the means of the cultivator. For France the figure is 19, and for Australia only 9 bushels per acre.

The diversity of the varieties of wheat grown in India is very large. The head botanical expert attached to the Government Research Station at Pusa has enumerated and described 37 distinct botanical varieties, and has recorded the remarkable fact that the choicest qualities are retained for home consumption. That most in demand for export is a soft white variety deficient in "strength," and chiefly sought after on account of its great dryness and easy milling quality.

In discussing the future of the Indian wheat trade, Sir James Wilson states reasons for anticipating an increase in the world's supply of wheat, especially in Canada, the Argentine Republic, Russia, and India, due to the ever extending area of cultivation; but since it seems likely that the world's demand will keep pace with the supply, the present level of prices is likely to be maintained. For some years to come the writer is confident that the average price of imported wheat will not fall much below thirty-five shillings per quarter.

The principal factors which determine the value of wheat in the wholesale market are examined by Sir James Wilson, and as some obscurity exists on this subject, it may be of interest to recapitulate his conclusions. The value of wheat is

influenced by its cleanness, purity, quality, uniformity, dryness, milling quality, strength, and colour.

Cleanness means the absence of useless impurities.

Pureness means the absence of grains of other food plants.

Quality depends upon care in harvesting and absence of damaged or immature grains.

Uniformity denotes the absence of varietal differences.

The milling quality desired by the miller is found in a wheat, on the one hand, neither too woolly and tough, nor, on the other, too flinty and hard.

Strength is defined as the capacity of making large and shapely loaves. (There is some dispute among experts as to what physical characteristics this quality is dependent on; there appears to be little doubt, however, that it is connected in some degree with the presence or absence of phosphates in the grain. It is in this quality that most home-grown wheats are deficient.)

In this list the factors of direct interest to the agriculturist are uniformity, milling quality, and strength. The most important factor of all to the farmer is naturally absent from the above catalogue, and that is, cropping power. It is obvious that a difference of five shillings per quarter is of little importance to the home agriculturist if he can increase his outturn by more than 10 bushels per acre, but it should not be assumed, as it is often done, that the superiority of foreign wheats in, say, strength, or milling quality, is wholly due to climatic causes. The little scientific work that has been done in this country in connection with this subject goes to show that there is no reason why high cropping capacity should not be associated with better quality from the miller's point of view. It should also be borne in mind that while much is known as to difference of variety, as judged by external characters, very little has been done in distinguishing varieties when classified according to their crop-producing or other economic qualities only. The improvements that can be effected by a thorough study of economic qualities of varieties can be illustrated by the work done by the botanical experts in the service of the Government of India. Sir James Wilson reproduces a report by a leading miller in this country on some samples of wheat selected from the many varieties culti-

vated in India by Mr. Howard, of the Pusa Research Station. This report goes to show that it is possible to isolate from the mixed stocks grown in that country wheats of practically any association of characters, and of many diverse types, ranging from emmer, probably the first cereal cultivated by man, to wheat of a quality rivalling that of No. 1 Manitoba Hard.

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**The Caraway Seed Industry in Holland.**

The caraway plant (*Carum carvi*) is a biennial, about 1½ to 2 feet high, which is cultivated for its seeds in some parts of England, particularly in Essex and Kent, and also in Holland, Germany, and Northern Russia. The seeds are used in confectionery, and also for flavouring spirits. On the Continent it is largely used for the distillation of *kümmel,* and for the production of an essential oil known as caraway oil, which is used for perfumery and medicinal purposes. The caraway oil imported into this country appears to come chiefly from Holland, where the area under cultivation has recently been greatly extended, and was in 1910 about 19,500 acres. The crop is grown chiefly in North Holland, Groningen, Zeeland, and North Brabant. A memorandum as to the method of cultivation in that country has been supplied to the Board through the Foreign Office by the Dutch Ministry for Foreign Affairs, in which it is stated that caraway is well able to withstand the cold of winter, though a cold, wet, early summer is prejudicial to growth. In the Netherlands and in more northerly regions, even in the extreme northern districts of Scandinavia, it can be cultivated without difficulty.

It grows in various kinds of soil, especially in a medium clay, but deeply tilled fertile soil, rich in humus and free from weeds, is probably most favourable.

*Cultivation.*—Caraway is a biennial plant, and therefore produces its seed the second year. For this reason it is sown under the cover of other plants, usually the pea. This plant, especially varieties with short stalks, does not choke the young caraway plants, and as it ripens comparatively early the caraway is able to develop strongly in the autumn after the peas have been cut. In the province of North Holland caraway is also grown under mustard and poppy when culti-

vated for seed. In the province of Zeeland it is sometimes grown under field and other beans. In the province of Groningen, where of recent years peas have suffered much from disease, some growers have adopted the practice of growing caraway among flax, with which white clover is also sown. In the first year the flax is harvested, in the second year the land is covered with white clover, and it is only in the third year that the caraway seed is completely harvested.

As a rule, caraway seed is sown simultaneously with or immediately after that of the covering plant, mostly towards the end of March or in the beginning of April, and usually in rows, so that the soil between the rows can be tilled by machinery or by hand. Before the seed is sown it is carefully mixed with the seed of the covering plant. Machines have been constructed which sow the caraway seed and the seed of the covering plant at the same time, but keep each kind separate. The seed of the covering plant is also sometimes sown first and caraway seed afterwards. The distance between the rows averages from 12 to 16 inches, and the quantity of seed sown is from 5 to 8½ lb. per acre. Broadcast sowing is less customary.

After the covering plant has been cut, the caraway begins to thrive well. Great care is devoted to the destruction of weeds by harrowing, hoeing, &c.; and towards the winter the rows are earthed up so as to cover the plant somewhat with earth. It is customary to cover the rows in winter with earth taken from ditches, or to dress them with stable manure, while in the event of the crops being in a bad condition, manuring with nitrate of soda in the autumn and early spring is of much assistance. In any case, every effort should be made to cause the crop to thrive the first year, as this determines the yield the next year. Caraway can never be too luxuriant; for this reason nitrate of soda should be given, even when the condition of the crop is normal.

The next spring the ground is again harrowed and hoed in order to loosen the soil and to remove the weeds. The caraway then soon begins to grow fast, blossoms in the second half of May, and is ripe towards the end of June or in the beginning of July. At this time the fruit has turned brown, and falls off easily.

Although the caraway is a biennial plant, only a part of the plants grow seed-stalks in the second year. On this account the plants can be allowed to remain a further year so as to permit of seed being harvested that year also. As a rule this second harvest is not so large as the first one. For this reason this method is only applied now and again in the province of Groningen.

*Insect Pests, &c.*—Caraway has only a few enemies. The stalks are sometimes attacked by *Sclerotinia Libertiana,* Fl., which disease also attacks rapeseed. The worst enemy is the caterpillar of the caraway moth, *Depressaria nervosa,* Haw., which often enough destroys whole fields of caraway. The caraway moth passes the winter as a moth, and lays its eggs in March or April on various umbelliferous plants. In May the first caterpillars are seen, these at first living on the leaves, but later on spinning the axes of the umbels together, and eating up both the flowers and the fruit. In the years 1895–1900 especially, great damage was caused in certain districts by the caraway moth; since that period but little has been heard of it. Furthermore, a disease, which has not yet been identified, has of recent years caused considerable damage, especially to caraway which is more than a year old.

*Harvesting.*—As the fruits fall off easily, harvesting must be done carefully, a little early rather than too late. The plants are cut with small scythes or sickles or with mowing machines; in dry periods the cutting should be done early in the morning and late in the evening, and not in the hottest part of the day. The loose sheaves are at once built up in small stacks of from twenty to thirty sheaves, which are tied with string as a protection against the wind. After two or three weeks the stacks are ready for storage in the barn or for immediate thrashing. The latter operation often takes place in the field.

*Yield, &c.*—The yield varies considerably, frequently from 6 to 16 cwt. per acre. A harvest of from 14 to 16 bales of 50 kilograms (110 lb.) each per acre is considered good. On an average, however, not more than from 10 to 12 bales per acre are reckoned upon, and the average for the whole country is under 10 bales, being in 1909 exactly $9\frac{1}{2}$ cwt. per acre. The seed is sold in bales of 50 kilograms (110 lb.),

principally to Germany, while the straw, 16 to 24 cwt. per acre, is used as cattle fodder or litter.

Caraway is an excellent crop in many respects. Harvesting takes place early, so that the stubble can be repeatedly ploughed and harrowed, and thus prepared for the next crop. After the caraway harvest, vetches are grown with success for the purpose of enriching the soil with nitrogen, and in some districts, *e.g.*, in West Friesland, various kinds of cattle fodder are grown. Prices, however, fluctuate greatly, and are sometimes very low, while in some years the caraway caterpillar does much damage. On this account caraway should not be grown on too large a scale. The price of the seed in 1910 was about 24*s.* per cwt., but afterwards fell to about 21*s.* 6*d.* per cwt.

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**The Use of Manures in Forestry.**

AT the Sixth International Forestry Congress at Brussels a paper was presented by Dr. Schwappach, Professor of Forestry at Eberswalde, dealing with the manuring of forest trees, a question to which some attention has been devoted in Germany during recent years. Dr. Schwappach observed that manuring had not the same importance in forestry as in agriculture. The relatively small amount of mineral salts retained in timber, the long period of time which intervenes between the planting and the felling of a forest, the fact that trees during their growth give back to the soil the greater part of their mineral constituents by the fall of leaves and twigs, and, lastly, the decomposition of the soil which is constantly going on, all render unnecessary the replacement of mineral salts by artificial means. The old Continental forest soils, moreover, are usually sufficiently rich in mineral salts, and do not suffer from exhaustion under the present-day systems. In addition, artificial manuring causes a rise of 50 to 100 per cent. in the cost of planting, for which no return can in any case be obtained until the end of the rotation.

It is now twenty years since experiments in manuring were begun, first in Belgium and Holland, and afterwards in Germany. The results up to the present tend to show that

in the better types of soils the necessary food salts are present in sufficient quantity, and that artificial manuring is only of importance where the soil has deteriorated, or in cases where it is desired to carry a crop quickly over some critical period, such as danger from frost or game. Owing to the relatively deep position of the roots, manuring with ordinary manures is practically without result on middle-aged woods. The only possibility of encouraging the development of such woods seems to lie in bringing about the quicker decomposition of the fallen leaves and twigs, either by working the soil, or, better still, by the application of lime. The irrigation of a sixty-year-old pine wood at the Berlin Irrigation Works with sewage water was tried, but was a distinct failure, as a monthly application during the chief vegetation period of the year caused, in two years, the death of many stems. Considerably better results were obtained by irrigation experiments at Görlitz, where irrigated plantations of spruce, Weymouth pine, and Scotch pine showed a better growth than those not irrigated. In this case, however, the woods treated were, at the most, thirty years old, and the importance of age seems to be shown by the fact that at the Berlin Irrigation Works new plantations on irrigated areas have shown good growth. A form of manuring in pine woods which offers prospects of success is the covering of the soil with a layer up to 8 inches deep of city refuse. The City of Berlin has experimented in this direction, with the result that after two years the pine woods treated showed excellent development.

It is, however, in the planting and early growth of trees on poor soils that artificial manuring assumes importance. Soil analyses show that in poor, sandy soils the nitrogen contents have been reduced to a minimum, and consequently this element is the chief consideration; phosphoric acid also plays an important part, but potash is only of subordinate importance. As nitrate of soda and sulphate of ammonia are too rapid in their action for a slow-growing crop, the chief difficulty in manuring on sandy soils is to supply nitrogen in a slowly available form at the least cost. Up to the present, experiments indicate that this can best be done by utilising the nitrogen contained in plant residues in

one of the following ways:—(1) planting of leguminosæ, especially lupins and acacias, on sandy soil, and trefoil and grey alder on chalky soils; (2) dressings with turf and other substances containing humus; (3) covering the soil with lupin-haulm, potato tops, straw, leaves, and small twigs; and (4) interplanting with a species having a heavy leaf fall, such as *Pinus rigida* and *Pinus montana*. Lupins, which in many cases have proved of great value, can be used in one of two forms, either as a crop before the trees are planted, or between the lines of trees. For the first purpose, the yellow lupin, and for the second the blue lupin, is best suited. When the whole area is cropped before planting trees, a dressing of about $3\frac{1}{4}$ cwt. to $6\frac{1}{2}$ cwt. of basic slag and $1\frac{3}{4}$ cwt. to $3\frac{1}{4}$ cwt. of kainit per acre should be used. In addition inoculation with nitragin may be recommended, although lupins generally grow well, even on poor heath lands, and on soils which have not carried a leguminous crop. If the lupins develop poorly in the first year, they must be sown again the second year. It is necessary in every case to get a good crop of lupins before planting. The cost of raising a crop of lupins is said to be about £1 12*s*. per acre in Germany, but in Belgium an intermediate crop of rye or oats is taken in order to reduce the cost. The fact that phosphoric acid and nitrogen are removed by rye and oats is not sufficient to prevent an appreciable enrichment of the soil in these substances. In Germany, experiments are being made to test the effect of substituting potatoes for rye as an intermediate crop. This method has the advantage that the soil is worked up in digging the potatoes, and the tops are left on the ground.

A cheap system is to interplant with blue lupins. By this method the area is ploughed up in the late autumn in the usual way, and during the winter manured in the drills with basic slag and kainit. The pines are planted the next spring. In this way only 25 to 30 per cent. of the area is manured. In favourable seasons excellent results are obtained. On chalky heathland, the place of the lupin can best be taken by *Trifolium hybridum*, grown between the forest trees.

There are also a number of trees which possess the property of utilising the free nitrogen of the air, and making it avail-

able, not only for their own growth, but for that of species planted with it. In middle Europe the chief are the acacia and grey alder, the first on sandy soil, the second on chalky soil.

Applications of turf and other material containing humus, especially dried turf, have given very satisfactory results under unfavourable conditions. By this method pines are either planted in pits, which are filled up with a mixture of humus and sand, or these materials are placed in trenches between the trees of the existing crop. In the first case covering with small twigs, lupin haulm, potato tops, and similar waste material works well in the first year. Another method of manuring is to mix with the pine those species which shed a large quantity of needles, such as *Pinus rigida* and *Pinus montana*. About the tenth year the common pine should overtake and suppress the species mixed with it, but by this time the canopy should be complete.

The use of other nitrogenous manures, such as nitrate of soda, &c., is, in ordinary circumstances, out of the question, but their use may sometimes be justified on plantations five to ten years old which for some reason or other are not growing well. Such an application of nitrogenous manures causes an excessive growth of weeds, which necessitate considerable attention to the young crop.

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**Isle of Wight Bee Disease.***

For some years past an epidemic disease has attacked bees in the Isle of Wight, and has since reached the mainland, where it appears to be spreading. The epidemic has been under investigation for some time by the Board of Agriculture and Fisheries, but though a good deal of information has been accumulated and some progress made with the study of the disease, it is not yet possible to say definitely what is the originating cause of the disease, or how it may be checked, or even prevented. The investigation, however, is being continued, and it is hoped that eventually a remedy will be found.

In the meantime, it is important that bee-keepers should

* This note is now being issued as a leaflet (No. 253), and copies may be obtained on application to the Secretary, Board of Agriculture and Fisheries, Whitehall Place, London, S.W.

watch their bees, and on the appearance of the symptoms described below proceed to—

(1) Destroy the diseased colonies, and all combs, stores, and quilts.

(2) Paint the hive and all woodwork twice at intervals of 24 hours with a solution of 1 part strong carbolic acid and 2 parts hot water, and then expose the inside of the hive to light and air for several days. Alternatively the surface of the woodwork may be burnt by means of a painter's spirit lamp.

(3) Collect and burn the dead bees found on the ground. The ground should then be sprayed with some strong disinfectant, such as 8 oz. carbolic acid to a gallon of water; or it may be covered with quicklime.

*Symptoms.*

1. The first symptom usually noticed is a disinclination of the bees to work. They fly about aimlessly and do not gather stores.

2. A little later they lose their power of flight, and are unable to travel more than a few yards without alighting.

3. As the disease progresses the bees are only able to fly a few feet, when they drop and crawl about the ground. They may be seen crawling up grass stems or other upright objects such as the supports of the hive, but they soon fall down and die. Towards night some may be seen gathered in groups, but these usually die before morning.

4. The abdomen or hinder part of the body is often swollen, and the extreme segments or rings droop and are bent underneath the rest of the body.

5. The wings often appear to be disconnected, the upper wings lying flat above the body, while the lower wings stand out from the body as in flight. Sometimes the legs seem affected, and the bees stagger along in their attempts to walk.

6. Finally the whole colony of workers is found massed together in front of the hive or on the ground, except a few which are found crowded round the queen.

7. The foragers are always the first affected. The queen and the brood are not attacked, though "chilled brood" often appears subsequently, owing to there being insufficient bees to keep the hive warm.

8. In winter and early spring, when bees are often attacked, the walls, combs, and alighting board are frequently soiled by the bees. This seldom if ever takes place in the summer.

Although it is not certain what is the direct cause of this disease it can be distinguished from some of the other diseases to which bees are liable. Thus, in cases of Bee Paralysis, the hinder part (abdomen) of the bees is discoloured and blackish. The bees tremble and the wings are bent up in a way that is not the same as the distortion visible in Isle of Wight Disease. In cases of "May Pest" both young and old bees are affected, and their bodies are covered with a light grey dust. In cases of Dysentery the bees soil the combs as in Isle of Wight Disease, but the droppings are dark and muddy, and not of the yellow colour that is usual in the present disease. A course of treatment for all these diseases is given in the text-books on bee-keeping.

## SUMMARY OF AGRICULTURAL EXPERIMENTS.*

### Field Crops.

**Seed Potatoes of Different Sizes** (*Field Expts. in Staffs and Salop and at Harper Adams Agric. Coll., Joint Report,* 1910).—The opinion is held by some growers that in the case of Langworthy and potatoes of a similar type large sets should be used, and that though this is a kidney potato and therefore does not sprout freely, it is preferable to cut ware rather than plant seed size. In order to test the point, Langworthy potatoes of the following sizes were obtained from Scotland:—(1) Seed size, between $1\frac{1}{4}$ and $1\frac{1}{2}$ inch riddles; (2) large ware size, over $2\frac{1}{4}$ inch riddles; (3) ware size, between $1\frac{1}{2}$ and 2 inch riddles.

The manner in which the seed was planted and the crops which were obtained were as follows:—

| | Weight of seed per acre. | Crop of ware per acre. |
|---|---|---|
| | lb. | tons cwt. |
| Seed size ... ... ... | 1,200 | 8 4 |
| Large ware (cut) ... ... | 3,360 | 10 12 |
| Ware (cut) ... ... ... | 1,440 | 10 19 |
| Ware (whole) ... ... | 3,040 | 10 1 |

It will be seen that the best result was obtained, both in yield per acre and in return per lb. of seed planted, by cut ware at the rate of 1,440 lb. per acre.

* A summary of all reports on agricultural experiments and investigations recently received will be given each month. The Board are anxious to obtain for inclusion copies of reports on inquiries, whether carried out by agricultural colleges, societies, or private persons.

**Correlation between the Number of Eyes in Seed Potatoes and the Yield** (*Deutsche Landw. Presse, February 8th,* 1911).—Tests carried out with four varieties of potatoes at the Agricultural Station at Ope, in Sweden, in 1908, appeared to show the existence of some definite connection between the number of eyes in the "sets" and the yield.

Further experiments were undertaken in 1909 and 1910 at three Swedish Experiment Stations. As a rule the number of eyes can be taken as proportional to the size of the tuber, but in these trials tubers of the same size, but with different numbers of eyes, were chosen as far as possible. It was again established that the number of eyes in the sets has an influence on the yield, both the weight and number of the tubers increasing with the number of eyes. The following were some results obtained :—

| Variety. | No. of eyes. | Yield from 10 sets. | |
|---|---|---|---|
| | | Weight. | No. of tubers. |
| | | lb. | |
| White "Jemtland" ..... | 4·0 | 8·6 | 156 |
| ,, ,, ..... | 10·2 | 13·8 | 244 |
| "Mandel"..... | 3·6 | 5·3 | 127 |
| ,, ..... | 10·1 | 10·8 | 270 |
| — | 5.0 | — | 98 |
| — | 9·5 | — | 177 |
| | | Yield from 25 sets. | |
| Red "Jemtland" ..... | 8·2 | 21·4 | 287 |
| ,, ,, ..... | 12·6 | 30·6 | 497 |

It is suggested that the productivity of a variety can be raised by making use of these results, since it was found that the characteristic of a large number of eyes in the sets was transmitted to the crop of tubers obtained; *e.g.,* the following relation between the number of eyes in the sets and in the tubers yielded was obtained in 1909 :—

| Number of eyes in sets. | Number of eyes in potatoes harvested. | | |
|---|---|---|---|
| | Large tubers. | Average. | Small. |
| 6·4 | 9·8 | 6·6 | 6·8 |
| 12·4 | 13·0 | 9·9 | 7·7 |

**Varieties of Cereals and Thick and Thin Seeding of Oats** (*Field Expts. in Staffs and Salop and at Harper Adams Agric. Coll., Joint Rept.,* 1910).—Sixteen varieties of wheat were tried in 1910 on a good loam soil previously under seeds, which had been dressed with 8 tons of farmyard manure in July, 1909. The yields exceeded those of any previous year, and all the crops were harvested in good order. There were no great differences between the yields of the English wheats, but Browick Grey Chaff again gave the largest yield (54 bush. per acre), and the most profitable return per acre for grain and straw. The next in order were Regenerated Squarehead, Victor, and White Wheat, all

of which gave 52 bush. per acre, the last, however, being sprouty, was valued at 2*s*. per bushel less than the first two. Home seed of two French varieties was sown, and they yielded as follows:—Sensation, 42 bush. per acre; Marvel, 39 bush. per acre. In 1909 the yields of these two from French seed were 36 and 41 bush. respectively. The highest quality wheat grown was J.08, a selection from Red Fife, which was valued at 34*s*. per bush., with a yield of 42 bush. Fife (Home seed) was valued at 33*s*. 3*d*. per bushel, and gave 45 bush. per acre. This was sown at the rate of 240 lb. per acre instead of 150 lb., as in the case of the other varieties.

Ten varieties of oats were grown after mangolds on a somewhat heavy loam in fair condition. They were manured with 2½ cwt. dissolved bones and ½ cwt. calcium cyanamide per acre. The yields of oats also exceeded those of any previous year. The best result, 98½ bush. per acre, was given by Thousand Dollar, which has consistently shown good results on the College farm. New Abundance and New White Horse both gave 92½ bush., and a new variety, Garton's 2209, gave 94½ bush. This sort looked remarkably well throughout the season, and appeared to promise the best crop. On the whole it stood up better at harvest than Thousand Dollar and Abundance. The weight of this variety was, however, only 39½ lb. per bushel, as compared with 43 to 45 lb. in the case of the three other varieties named.

A trial was made to test the comparative advantages of thick and thin seeding of oats. A correspondent was of opinion that a thickly-seeded crop on rich land is less likely to lodge, and further that with thick seeding the crop starts better, while rank growth and lodged grain is checked by the thickness of the plants. Plots were sown at the rates of 280, 240, 200, and 160 lb. per acre, the usual rate of sowing at the College farm being 200 lb. per acre. The yields did not vary very greatly, being 94½, 91¼, 92½, and 86¼ bush. (of 39 lb.) respectively per acre. After deducting the cost of the seed the net return was greatest with sowing at 200 lb. per acre, though, as will be seen, the heavier sowing gave the largest yield. Very little difference was to be seen in the appearance of the plots before harvest, and on all plots patches were laid, there being practically no difference in this respect.

**Varieties of Mangolds and Swedes** (*Field Expts. in Staffs and Salop and at Harper Adams Agric. Coll., Joint Report,* 1910).—A comparison of fourteen varieties of mangolds was made in 1910. The best yields were as follows:—Sutton's Prizewinner Yellow Globe, 45 tons per acre; Leighton's Timmis, 44 tons 5 cwt.; Garton's Red Globe, 43 tons 11 cwt.; Dickson and Robinson's Defiance, 41 tons 18 cwt.; Hayward's Challenge, 41 tons 18 cwt. Four varieties have been grown for five or six years, and the following are the average yields given by them:—Dickson and Robinson's Eclipse Red, 43 tons 16 cwt.; Sutton's Prizewinner Yellow Globe, 42 tons 10 cwt.; Sutton's Golden Tankard, 33 tons 8 cwt.; Garton's Improved Yellow, 31 tons 4 cwt.

Twelve varieties of swedes were tried. There was little difference between the yields of most of them, the three first being:—Incomparable, 22 tons 6 cwt. per acre; Keepwell (Garton), 22 tons 3 cwt.; and Nimrod (Dickson and Robinson), 21 tons 16 cwt.

**Seeding of Temporary Ley** (*Field Expts. in Staffs and Salop and at Harper Adams Agric. Coll., Joint Report,* 1910).—The following trial

has now been carried on over three seasons with the object of ascertaining the amount of seed it is economical to use for a one year's ley. The plots in each trial were seeded down in the barley crop of the preceding year, and the produce of the plots was cut and made into hay before weighing. The mixtures consisted of Italian Rye Grass, Red Clover, Alsike, and Trefoil, and in some of them Cow Grass, Perennial Rye Grass, and White Clover were added. The amount and cost of the seed used and the resulting crops are shown below :—

| Weight of seed per acre. | Cost of seed per acre. | Average crop. |
|---|---|---|
| lb. | *s.* *a.* | tons cwt. |
| 15 | 10 7 | 2 7 |
| 22½ | 14 7 | 2 5 |
| 35¼ | 20 4 | 2 5 |
| 17 | 12 0 | 2 7 |

The heavy seedings have thus not given so good a return as the lighter seedings. Very little difference could be seen in the appearance of the plots after cutting.

## LIVE STOCK, POULTRY, AND FEEDING STUFFS.

**The Feeding Value of Different Varieties of Mangolds** (*Jour. Agric. Science, Vol. iii., Pt.* 3, *September,* 1910).—An investigation into the chemical composition of mangolds, which was begun in 1903 at Cambridge University, showed that the Long Red mangold, owing to its high yield and percentage of dry matter, produces about 20 per cent. more dry food per acre than any other variety. At the same time a series of feeding experiments was started in order to discover whether this superiority of the Long Red over the Globes and Tankards would be borne out in practical farming, that is to say, whether the feeding value of any type of mangold is proportional to its percentage of dry matter. The chemical investigation and the earlier feeding trials were noticed in the *Journal* for October, 1908, p. 538, but this paper contains a complete summary by Prof. T. B. Wood of the whole investigation which has been carried out by him since 1907.

The points tested were the comparative feeding value of Yellow Globe and Long Red mangolds as constituents of a liberal fattening diet, the comparative feeding value of Golden Tankard and Long Red mangolds, also in a fattening diet, and the comparative feeding value of Yellow Globe and Long Red mangolds for store cattle. Every precaution was taken to choose for the experiment animals of uniform weight and capacity for growth, but, in spite of this, it was found that in a single trial the variation among the individual animals receiving the same treatment was far greater than the quantity the experiment sought to measure, and Prof. Wood remarks that little reliance can be placed on the results of single experiments with the small number of animals commonly employed in feeding tests. The results of all the trials are discussed according to the methods used in the theory of probabilities in order to find which of the results obtained were really significant of some difference in the feeding value of the mangolds, and not due to variations in the capacity of the animals for improvement, and the following conclusions are arrived at :—

From seven trials on fattening cattle with Long Red and Yellow Globes, the relative feeding values of the two types are approximately as 116 to 100 in favour of Long Red. This agrees as well as can be expected with the relative percentages of dry matter, which are as 120 to 100 in favour of Long Red.

Two comparisons of Long Red and Golden Tankard indicated that there is no appreciable difference in the feeding value of these types. This also agrees with the fact that their percentages of dry matter are practically equal. The three experiments with store cattle were regarded as inconclusive.

**Autumn Chicken Rearing** (*Field Expts. in Staffs and Salop and at Harper Adams Agric. Coll., Joint Report,* 1910).—The objects of this experiment were to find the cost of rearing autumn-hatched chickens to a killing age, and to note the rate of increase in weight week by week for food consumed. The cost of spring rearing is to be determined in the spring of 1911 in order to compare it with autumn rearing. Thirty-one eggs were put in the incubator on September 30th, of which 21 were fertile and 17 hatched. One chick was accidentally killed. The trial extended over eighteen weeks. For the first fortnight the chicks were fed on a dry mixture containing no meat, which cost 12*s.* per cwt. From the second to the sixth week they were fed on a mixture containing meat at a cost of 24*s.* per cwt. From the sixth to the sixteenth week they received the same mixture as at first at a cost of 12*s.* per cwt. During the last two weeks of this time they were given a midday soft feed of 2 parts fine oatmeal and 3 parts wheat meal mixed with separated milk. For the last two weeks of the trial the soft food was given twice a day, and consisted of 2 parts fine oatmeal, 3 parts wheat meal, and 2 parts maize meal mixed with separated milk, while the evening feed was changed to whole barley.

At the end of the 18 weeks the average weight of the chickens was 3 lb. 12½ oz., and the food consumed by each was 14 lb. 9 oz. The cost and returns worked out as follows :—

| | *s.* | *d.* |
|---|---|---|
| Cost of thirty-one eggs ... ... ... ... ... | 5 | 2 |
| Cost of oil for incubator and brooder ... ... ... | 1 | 1 |
| Cost of grain and meal ... ... ... ... ... | 25 | 5½ |
| Total cost of rearing sixteen chickens ... . . | 31 | 8½ |
| | *s.* | *a.* |
| Average cost per chicken ... ... ... ... | 2 | 0 |
| Market value per chicken ... ... ... ... | 3 | 0 |

## DAIRYING.

**Use of Molasses as a Condiment in Food and its Effect on Milk Secretion** (*Die Landw. Versuchs-Stationen, Band lxxiv., Heft iii.–v.*). —This publication reports some experiments conducted by Herr Gustav Fingerling, of the Hohenheim Agricultural Experiment Station, as to the influence of condiments on milk secretion, in continuation of those noticed in this *Journal* for September, 1905, Vol. xii., p. 367. The experiments were carried out with three goats, and consisted in comparing the effect of a mixture of appetising foods composed of

meadow hay, sesame cake, brewers' grains, starch flour, and salt, with a specially compounded ration containing the same amount of food material, but in unappetising forms, viz., straw, gluten, and earth-nut oil, and then testing the effect of the addition of molasses to this latter ration.

The addition of molasses to the feeding stuffs poor in condimentary matter was found to raise the milk production by almost one-half as much again, the yield obtained being, in fact, practically identical with that obtained from the foods rich in condimentary stuffs (hay, brewers' grains, &c.). It is suggested, therefore, that the agriculturist possesses in molasses a means of making tasteless or unsavoury food more acceptable to animals. Molasses contains materials which, apart from their content of digestible foods, have a considerable influence on milk secretion. The poorer the fundamental rations in sweet tasting or sweet smelling materials, the more marked was the effect of the addition of molasses.

Experiments on feeding molasses to dairy cows were also noticed in this *Journal*, June, 1901, Vol. viii., p. 45.

**Influence of Foods on the Composition of Milk Fat** (*Die Landw. Versuchs-Stationen. Band* lxxiv., *Heft* iii.–v.).—In continuation of the foregoing experiment, the influence on milk fat of the feeding stuffs given to cows was investigated. Roots, potatoes, and lucerne were compared with dry foods as before. The milk was left to stand for twenty-four hours, when the cream was taken off and made into butter. From the butter fat obtained were determined the saponification number, the Reichert-Meissl number, and the iodine number, then the refractive index and the melting-point. The following conclusions were drawn from the experiment:—Feeding with foods the fat of which has a high iodine number (*e.g.*, maize, barley, bran, and rape seed cake) raises the iodine number but lowers the Köttsdorf and Reichert-Meissl numbers. Compared with concentrated foods such as maize and rape seed cake, roots and potatoes increase the content of volatile fatty acids in the milk fat. Although the fat in the foods influences the composition of the milk fat, rations composed of quite different feeding stuffs can produce the same amount of milk fat. Towards the end of lactation the saponification and Reichert-Meissl numbers of the milk fat are lowered, while there is a rise in the iodine number, the refractive index and the melting-point. After a change in feeding (*e.g.*, from watery to dry foods) the saponification and iodine numbers of the milk fat are quicker to change than the Reichert-Meissl number.

**An Organism producing a Burnt-milk Taste** (*Centralblatt für Bakteriologie, &c., Abt. II., Bd.* 29, *Heft* 1–3).—This journal contains an interesting note on a new organism which has been isolated by Mr. Wilfrid Sadler, Assistant Instructor in Dairying and Dairy Bacteriology at the Midland Agricultural College, Kingston. In the autumn of 1909 the College received a sample of milk possessing a peculiar flavour and aroma. The milk was soured, and had an aroma resembling caramel, while the taste or flavour was similar to that of milk which had been cooked or burnt; further, the flavour was distinctly bitter, the milk thus being totally unfit for consumption.

Quantities of sterile milk were inoculated and submitted to fermentation tests, and were found to possess the same unmistakable properties as were exhibited by the original sample. Experiments of this nature were repeated with various milks, fresh, pasteurised, and sterilised, until it became evident that the trouble was a bacterial one. The adoption of the usual methods for the isolation in pure culture of bacteria resulted in the discovery of the organism, which is of the general type of Leichmann's *Bacterium lactis acidi,* and which, on inoculation into the milk, first produces the distinctive aroma referred to, and later brings about coagulation.

In the spring of last year the same trouble arose in the milk bought by the College for manipulation in the dairy, and since that time its occurrence has been intermittent. This intermittent nature of its recurrence has been one of the most prominent features observed during the investigation, particularly during the early part of the year. The contamination has been traced to a particular farm, but as yet the actual source of the organism has not been definitely determined. Mr. Sadler purposes to continue his investigations during the present year.

While the effect of this organism on milk intended for consumption as such is well-nigh disastrous, the result of its action on butter and cheese is very marked, and without doubt it might be the cause of much loss if it should arise in the dairy. Butter and cheese made from milk inoculated with a culture of the organism were found to have the characteristic flavour and aroma, and were both unpalatable and unsaleable. Butter was also made from the cream inoculated with a good lactic acid starter and a culture of the organism. In this experiment the flavour and aroma were sufficiently evident to prove that butter made from cream thus contaminated would have a poor market value, even when a good starter is added with a view to overcome the taint.

**Milking-Machine Experiments in Belgium** (*Revue Générale Agronomique,* December, 1910).—Trials have been made at the Zootechnical Institute of the University of Louvain of the "Alfa-Dalen" milking-machine. With a view to determining whether milking by the machine was more thorough than by hand, experiments were carried out in which four cows were milked by hand for ten days and by machine for the succeeding sixteen days. In each case three milkings were made per day, and the amount of milk left in the udder determined immediately after milking, by means of a supplementary milking. With two cows the machine gave better results, and with the other two cows hand milking was more thorough. The results, on the whole, however, were in favour of the machine, whether the absolute amount of milk left in the udder be considered, or the ratio of this amount to the amount actually obtained. The milk left in the udder per cow per day, after mechanical milking, was 0·50 pint as compared with 0·59 pint after hand-milking. A longer time was taken to empty the udder by machine than by hand, a fact which might have had some influence on the yield. Though the amount of milk obtained from the first morning's milking (6.15 a.m.) was in the case of both methods almost double that obtained at either of the two

subsequent milkings, it was noticeable that there was no appreciable difference in the amount left unmilked at the three milkings.

To ascertain the influence of the machine on the total milk production, the four cows were milked solely by machine for four and a half months. The amount of milk per cow per day obtained during the two experimental periods was 9·992 kilog. in the case of hand milking, and 10·920 kilog. in the case of mechanical milking. The cows which were milked by machine gave therefore a higher yield by about 2 lb. Apart from the small number of cows used, the comparison is unequal owing to the fact that the machine milking was continue for $4\frac{1}{2}$ months, while the hand milking with which the results are compared extended over ten days only.

## WEEDS AND INSECT AND FUNGUS PESTS.

**Destruction of Thistles** (*Field Expts. in Staffs and Salop and at Harper Adams Agric. Coll., Joint Report,* 1910).—These experiments were continued in 1910, and the conclusions stated in the *Journal,* March, 1911, p. 1,019, were confirmed.

At the request of the Board of Agriculture a special tool was tried on an additional plot. The tool resembled a much elongated pair of pliers, the object being to grip the plant and pull up a length of root. A comparison was made between the time taken in using the tool and cutting with a scythe. With careful use with this tool thistles could be pulled out with as much as 4 inches of underground stem attached, but in dry weather the plants broke off close to the surface, leaving the underground stems to form fresh shoots. The implement was tedious to use, and only a small area could be covered in a day. The cost worked out as follows:—"Plot A," with special tool.—One acre required 10 days' labour at 2*s.* 8*d.* per day, equalling £1 6*s.* 8*d.* per acre. "Plot B," cutting with scythe.—$1\frac{1}{2}$ acres were cut per day, with labour at 2*s.* 8*d.* per day, equalling 1*s.* 9*d.* per acre. The effect of the treatment on these two new plots was not noticeable the first season, but will be recorded in 1911.

**Internal Disease and Sprain (Streak Disease) in Potato** (*Jour. Agric. Science, Vol. III., Pt.* 3, *September,* 1910).—In this paper Mr. A. S. Horne, B.Sc., describes the symptoms of these two diseases, which at present appear to be distinct. It has been stated that if tubers affected with them are planted a healthy crop will nevertheless result. Experiments to test this point were made, and it was found in the case of both internal disease and streak disease that when diseased sets were planted a certain proportion of the tubers produced were affected. The question of whether the diseases spread during storage was also examined. Tubers were cut in half, and some sprinkled with lime and some not. Under these conditions the diseases did not appear to increase in the affected tubers or to spread to others, but the question was complicated by attacks of other diseases.

**A Bacterial Disease of Swedes** (*Jour. of Agric. Science, Vol. iii., Pt.* 4, *December,* 1910).—This is a report of an investigation carried

out at Bristol University by Messrs. J. H. Priestley and A. E. Lechmere. Specimens of swedes attacked by this disease were sent from the neighbourhood of Taunton to the University of Bristol. The first indication of attack was described as being the appearance of a small crack on the side of the root, almost as if made by a hoe; this crack gradually widened, the interior being filled with slimy, rotting tissue, and in many cases the plant died. By infecting pieces of fresh swede and turnip with slime from a diseased root, the decay was shown to be due to bacterial action and not to an injury alone. Several organisms were isolated, and the one to which the disease is attributed is considered to be probably *Bacillus oleraceae* (Harrison), the cause of soft black rot of cabbages, but also closely allied to *Pseudomonus destructans* (Potter), which causes soft white rot in turnips, &c. It is suggested, after consideration of its appearance on various culture media, that these two organisms may be different growth forms of the same parasitic species.

The cultures show that the organism is capable of existence as a saprophyte, and this means that it may continue to exist in the soil, on rotting tissue, long after the crop itself has been removed. This makes the question of the extermination of the disease a difficult one; one obvious precaution is to lengthen the period as far as possible between successive crops of the turnip and cabbage kind when the disease has once appeared. It seems capable of growing in both an alkaline and an acid medium, so that it does not seem clear that any particular dressing applied to the soil would affect its increase. In this particular case of infection the disease was prevalent at the same time, and under the same conditions, as finger-and-toe, which would indicate insufficient lime in the soil. The practical question of the treatment of the soil would, however, need to be investigated by field experiments.

**Wart Disease of Potatoes** (*Wart Disease of Potatoes, Harper Adams Agric. Coll.,* 1910).—These experiments are included among those on which a report appeared in the *Journal,* April, 1911, p. 42. The present bulletin contains the results of inquiries as to the method of infection and of the spread of the disease, and details of the experiments carried on at the Harper Adams College in 1909 and 1910 to discover resistant varieties of potatoes, and a means of checking the disease by fungicides. The yields of all the varieties resistant to the disease that have been grown are shown. The fungicide dressings that were tried consisted of quicklime, gas lime, sulphur, salt, soot, copper sulphate, sodium borate, potassium sulphide, black sulphur, ferrous sulphate, strawsonite, and a proprietary Black Scab Compound. None of them was found to be of any value.

## OFFICIAL NOTICES AND CIRCULARS.

**County Committees for the Encouragement of the Horse-breeding Industry.**

The President of the Board of Agriculture and Fisheries is appointing Committees in each county for the purpose of assisting the Board in all matters pertaining to the encouragement and improvement of the horse-breeding industry. The members of these committees are nominated by the Chairmen and Conveners of the County Councils, and are gentlemen having an intimate acquaintance with the industry of horse-breeding, and with their assistance and co-operation the Board hope to ascertain in the fullest manner all necessary details as to the character and extent of the industry in the localities which they represent.

The names and addresses of the gentlemen forming the Committees in the following counties were given in last month's *Journal* (p. 58):—Cumberland, Gloucester, Hereford, Isle of Wight, Northampton, Rutland, Salop, E. Sussex, W. Sussex, Staffs, Westmorland, Worcester, Yorks (E. R.), Brecknock, Carmarthen, Denbigh, Monmouth, Radnor, Argyll, Bute, Dumbarton, and Renfrew. Committees have also been appointed for the following counties:—

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Captain G. A. Wilson, The Haughs, Keith.
*Secretary,* George Donald, Ladyhill, Keith, Banffshire.

**Berwicks.**

The Lord Dunglass, Springhill, Coldstream.
Sir John Home-Purves-Hume Campbell, Bart., Marchmont, Duns.
T. Calder, Swinton Hill, Coldstream.
George Dove, Whitehouse, St. Boswell's, Newtown St. Boswell's, Roxburghshire.

J. Fulton, Hatchednize, Coldstream.
J. L. Greig, Eccles, Kelso.
Major J. Hunter, Anton's Hill, Coldstream.
Lieut.-Colonel W. Murray Threipland, Dryburgh Abbey, St. Boswell's, Newton St. Boswell's, Roxburghshire.
Major R. D. Sinclair Wemyss, Wedderburn Castle, Duns.
*Secretary,* J. Fulton, Hatchednize, Coldstream.

**Caithness.**

Alexander Clyne, Tister House, Halkirk, Caithness.
Alexander Gunn, Ochalone, Halkirk, Caithness.
A. W. Henderson, Bilbster House, Wick.
D. P. Henderson, Stemster House, Halkirk Roadside, Halkirk, Caithness.
Dr. J. R. Kennedy, Dunheath, Caithness.
George King, Berriedale, Caithness.
William Smith, Forss, Thurso.
*Secretary,* James Young, County Clerk's Office, Thurso.

**Clackmannan.**

John Ernest Kerr, Harviestoun, Dollar, N.B.
D. A. Kinross, Hillend, Clackmannan.
Captain James Younger, Beechwood, Tillicoultry.
*Secretary,* J. W. Moir, County Buildings, Alloa.

**Dumfries.**

Lewis Beattie, Mossknowe, Canonbie, Dumfriesshire.
Charles Brook, Kinmount, Annan.
W. L. Carlyle, Templehill, Ecclefechan.
Major Carruthers, Dormont, Lockerbie.
P. A. Johnson-Ferguson, Knockhill, Ecclefechan.
H. C. Irving, Burfoot, Ecclefechan.
J. Stewart Lyon, Jessfield, Amisfield, Dumfries.
J. J. Paterson, Terrona, Langholm.
C. W. Ralston, Dabton, Thornhill.
*Secretary,* Major H. Hall, Denbie, Lockerbie.

**Fife.**

The Earl of Rothes, Leslie House, Fife.
Lord Ninian Crichton Stuart, House of Falkland, Falkland, Fife.
T. H. Erskine, Grangemuir, Pittenweem, Fife.
Captain John Gilmour, M.P., 1 Culford Gardens, London, S.W.
J. Millar, Waulkmill, Charlestown, Dunfermline.
G. Russell, Hatton, Lundin Links, Fife.
*Secretary,* F. W. Christie, Castlefield, Cupar.

**Forfar.**

James Carmichael, Atherstone, Meigle, Perthshire.
A. F. Durkie, M.R.C.V.S., Mill of Mains, Dundee.
Captain Hugh Annesley, Gray-Cheape, Carse Gray, near Forfar.
Herbert K. Ogilvy, W.S., Auchterhouse, Forfarshire.
Gavin Ralston, Glamis, Forfar.
W. Addison Scott, Newton of Arbirlot, Arbroath.
Provost Stewart, Chellwood, Monifieth, Dundee.
*Secretary,* R. Freer Myles, National Bank Buildings, Forfar.

**Inverness.**

The Mackintosh of Mackintosh, Moy Hall, Inverness.
The Lord Lovat, K.C.V.O., C.B., D.S.O., Beaufort Castle, Beauly, Inverness.
J. E. B. Baillie, M.V.O., Dochfour, Inverness.
Major Fraser-Tytler, Aldowrie Castle, Inverness.
Colonel A. W. McDonald, D.S.O., Blarour, Spean Bridge, Inverness.
J. A. R. Macdonald, Balranald, Lochmaddy, North Uist.
Major K. L. Macdonald, Skeabost, Isle of Skye.
Nicol Martin, Glendale, Skye.
*Secretary,* Duncan Shaw, County Clerk's and Treasurer's Office, Inverness.

**Lanark.**

Sir S. Macdonald Lockhart, Bart., M.V.O., The Lee, Lanark.
J. P. Baird, Castlemains, Douglas, Lanarkshire.
Charles M. Douglas, Auchlochan, Lesmahagow, Lanarkshire.
Richard Dunn, Udston, Hamilton.
Archibald M'Lean, Midtown of Blackwood, Lesmahagow, Lanarkshire.
Alexander Murdoch, East Hallside, Newton, Lanarkshire.
John Murray, Park Hall, Douglas, Lanarkshire.
T. Purdie Somerville, Sandilands, Lanark.
Colonel King-Stewart, Murdostoun, Newmains, Lanarkshire.
Wm. Templeton, Torland, Netherburn, Lanarkshire.
James C. Hope Vere, Blackwood, Kirkmuirhill, Lanarkshire.
*Secretary,* George Findlater, Jerviswood Mains, Lanark.

**Kincardine.**

Sir Thomas Burnett, Bart., Crathes Castle, Crathes, Aberdeen.
James Alexander, Bent, Laurencekirk, Kincardineshire.
George T. Brown, East Cairnbeg, Fordoun, Kincardineshire.
Colonel J. Davidson, Balnagask, Aberdeen.
W. G. Falconer, Cairnton, Fordoun, Kincardineshire.
Sydney J. Gammell, Countesswells House, Bieldside, Aberdeen.
George Milne, Mains of Barras, Stonehaven.
*Secretary,* George T. Brown, East Cairnbeg, Fordoun, Kincardineshire.

**Kirkcudbright.**

Major A. Brown, County Buildings, Kirkcudbright.
C. E. Galbraith, Terreglas, Dumfries.
Major C. G. Graham Hutchison, Balmaghie, Castle Douglas.
Major John McKie, D.S.O., Ernespie, Castle Douglas.
W. J. Herries Maxwell, Munches, Dalbeattie.
A. Mitchell, Lochfergus, Kirkcudbright.
C. A. Phillips, Dildawn, Castle Douglas.
*Secretary,* Major A. Brown, County Clerk, Kirkcudbright.

**Midlothian and Linlithgow.**

Colonel Gordon-Gilmour, C.B., M.V.O., The Inch, Liberton, Midlothian.
J. McHutchen Dobbie, Campend, Dalkeith, Midlothian.

Prof. James Cossar Ewart, M.D., F.R.S., F.Z.S., Craigybield, Penicuick, Midlothian.
James Fraser-Tytler, Woodhouselee, Roslin, N.B.
Enoch Glen, Glenavon, Bathgate, Scotland.
John T. McLaren, The Leuchold, Dalmeny Park, Edinburgh.
Seton M. Thomson, Preston House, Linlithgow.
Colonel R. G. Wardlaw-Ramsay, Whitehill, Rosewell, Midlothian.
*Secretary*, John Stewart, 3 Thistle Court, Edinburgh.

**Nairn.**

Alex. Clark, Blackparks, Nairn.
John Alexander Robertson, Royal Stables, Nairn.
J. S. Robertson, Cawdon Estate Office, Nairn.
*Secretary*, John Alexander Robertson, Royal Stables, Nairn.

**Roxburgh and Selkirk.**

The Right Hon. the Earl of Minto, K.G., &c., Minto, Hawick.
David Ballantyne, The Shaws, Newcastleton, Roxburghshire.
C. W. Grieve, Branxholm Park, Hawick, N.B.
Robert Henderson, Mount Hooly, Jedburgh.
T. Robert Scott, Lanton Tower, Jedburgh.
Captain Mark Sprot, Riddell, Lilliesleaf, Roxburghshire.
S. Strang Steel, Philiphaugh, Selkirk.
*Secretary*, John Scott, Ploughland, Ancrum, Roxburghshire.

**Shetland.**

Peter Anderson, Lerwick.
James Budge, Bigton, Levenwick, Shetland.
R. D. Ganson, Brentham Place, Lerwick.
J. C. Grierson, Helendale, Lerwick.
W. Laidlaw McDougall, Grutness, Sumburgh, Lerwick.
Peter Manson, Lunna, Vidlin, Lerwick.
Laurence Robertson, Setter Voe, Detting, Shetland.
John P. Sandison, Mandeville, Uyeasound, Lerwick.
*Secretary*, Archibald Sutherland, County Office, Lerwick

**Stirling.**

His Grace the Duke of Montrose, K.T., Buchanan Castle, Drymen, Glasgow.
Chas. Brown, Kerse Estate Office, Falkirk.
Thos. D. Wallace, Callendar Park, Falkirk.
David Wilson, Carbeth, Killearn, Stirlings.
*Secretary*, James Learmouth, County Buildings, Stirling.

**Sutherland.**

J. R. Campbell, Shinness, Lairg.
W. J. Dudgeon, Crakaig, Loth, Sutherland.
Hugh Gibson, Uppat, Brora, Sutherland.
A. Grant, Evelix Farm, Dornoch, Sutherland.
Donald McLean, Sutherland Estate Office, Golspie, Sutherland.
Geo. McIntosh, Pitgrudy, Dornoch, Sutherland.
W. R. Mundell, Dalchork, Lairg.
*Secretary*, A. S. Innes, Knockarthur, Rogart.

Inquiries are frequently addressed to the Board for information as to the whereabouts of Awards under Inclosure Acts passed prior to the General Inclosure Act of 1845.

**Memorandum as to the Custody of Inclosure Awards.**

2. All awards under the Act of 1845 are in the custody of the Board, and copies thereof are deposited with the Clerk of the Peace for the County concerned, and also with the Churchwardens of the parish or their successors in title. A list of all such Awards made up to the year 1893 is contained in a House of Commons Return (455 of 1893). Awards made under Acts passed between the General Inclosure Act, 1801, and the Inclosure Act, 1845, were in the absence of other provision in the authorising Act, to be enrolled in one of his Majesty's Courts of Record at Westminster, "or" with the Clerk of the Peace for the County, and inquiries as to their present place of deposit and as to opportunity of inspecting them may be addressed to the Public Record Office, Chancery Lane, London, W.C. The place of deposit of Awards made under Acts prior to, or not governed by, the General Inclosure Act, 1801, can be discovered only from examination of the particular provisions of each Act. In many cases these private Acts were not printed, and it would probably be difficult to discover any existing copy of the Act. Lists of local Inclosure Acts from 1727 to 1834 are contained in George Bramwell's Analytical Table of Private Statutes (2 Vols., London: 1813 and 1835). Reference to the Index of Local Acts, 1801–1899 (H.M. Stationery Office: 1900) may also be useful in an endeavour to trace information.

3. It will be seen that considerable difficulty may be experienced in tracing the Awards of Inclosure bearing date prior to 1845. Many of them are included in the House of Commons Return (No. 50 of 1904) of Inclosure Awards deposited with Clerks of the Peace or Clerks of County Councils, who may possibly in certain cases be in a position to supplement the information contained in that Return. Where this source of information fails, it may sometimes be possible to obtain particulars from the Steward of the Manor or from the Parish Council or Incumbent of the Parish concerned, or from Diocesan Registrars or Chapter Clerks.

4. A certain number of Inclosure Awards, or copies thereof, are in the custody of the Public Record Office, the Duchy of Lancaster Office, his Majesty's Commissioners of Woods and Forests, and the Ecclesiastical Commissioners. At the Public Record Office are kept those Awards which were transferred from the Royal Courts of Justice, as well as those transferred with the Land Revenue Records from the Office of Woods and Forests. The Commissioners of Woods and Forests have information only as to the whereabouts of such Awards as affect Crown property.

5. A very few Awards relating to lands in Middlesex are in the keeping of the Land Registry, Lincoln's Inn Fields, London, W.C., as successors to the Middlesex Registry of Deeds; and many relating to lands in Yorkshire (East, North, and West Ridings) are at the Registries of Deeds at Beverley, Northallerton, and Wakefield respectively. There is reason to believe that some Inclosure Awards have found their way into private hands, while a small number are under-

stood to be included in the collections of Manuscripts at the British Museum.

**Forestry Museum at the Royal Botanic Gardens, Kew.**—During the past few years, through the kindness of numerous contributors, it has been possible to acquire material to form the nucleus of a collection of exhibits illustrating British forestry. This collection is housed in Cambridge Cottage, formerly the residence of H.R.H. the late Duke of Cambridge, which was opened to the public in June last as a Forestry Museum.

With the idea of making the Museum as comprehensive as possible the six available rooms have been apportioned as follows :—

No. 1.—A collection of hand specimens of wood, fruits, seeds, photographs, &c., of various kinds of trees.

Nos. 2 and 3.—Planks, transverse sections of trunks, and trunk specimens of trees, together with mounted herbarium specimens and photographs of trees. Whenever possible, planks are shown 7 ft. long, 3 in. thick, and the width of a tree. Trunk specimens are obtained 6 ft. in length from the bases of trees, showing the buttresses, and transverse sections are 6 in. thick.

No. 4.—A collection of diseases, due to various causes, which are found amongst forest trees.

No. 5.—Collections of articles manufactured from British-grown timber, to represent the economic side of forestry.

No. 6.—Various tools and models of machinery used in forestry operations.

With the co-operation of estate owners and manufacturers it is hoped to make this museum as representative as possible of British forestry, and the Director of the Royal Botanic Gardens, Kew, will be pleased to receive contributions of interesting specimens at any time.

**Withdrawal of Orders Relating to Foot-and-Mouth Disease in Surrey.**—The Board of Agriculture and Fisheries, by Orders which came into operation on the 15th April, withdrew all the restrictions which were imposed by them on the movement of animals in connection with the recent outbreak of foot-and-mouth disease at Chobham, Surrey.

## MISCELLANEOUS NOTES.

**Importation of Horses into Ceylon.**—Regulations dated 2nd February last have been made under the Contagious Diseases (Animals) Ordinance No. 25 of 1909, regarding the importation of horses, &c., into Ceylon. Under these regulations, it is provided that every person importing horses, asses, or mules into Ceylon from oversea ports shall produce a certificate of inspection by a qualified veterinary surgeon certifying that they were free from disease immediately before shipment, and shall give notice of their arrival to the principal Officer of Customs, who shall cause such animals to be inspected before landing by a duly authorised veterinary inspector. No person shall land at any Ceylon port animals suffering from, or suspected to be suffering from, disease,

**Importation Regulations.**

provided that the principal Officer of Customs may, at his discretion, allow such diseased or suspected animals to be landed and detained in quarantine at such place, and for such a time, as he may deem necessary. Any horse, ass, or mule showing definite evidence of being affected with glanders or farcy shall be destroyed, and any animal showing definite evidence of other disease may be destroyed, if deemed necessary, with the special authority of the Government Agent. Compensation may be paid in respect of animals destroyed, such amount to be half the assessed value of the animal immediately before it was destroyed, provided that the sum paid shall not exceed 350 rupees for a horse or 75 rupees for an ass or mule (*Board of Trade Journal*, March 30th, 1911).

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**Demand for Agricultural Machinery.**

**Agricultural Machinery in Roumania.**—The *Nachrichten für Handel* (Berlin) of February 28th, contains a report by the German Vice-Consul at Craiova, from which it appears that there is a great demand in Roumania for agricultural machinery and accessories. In this connection the German Vice-Consul considers it very advisable to establish repair shops at one or more Roumanian centres. (*Board of Trade Journal*, March 16th, 1911.)

**Agricultural Machinery in India.**—Some information as to agricultural machinery and implements in India is given in the report of the Inspector-General of Agriculture on the progress of agriculture for the year 1909–10.

It is stated that progress must take place rather along the lines of improvement of the indigenous types of agricultural implements than by the introduction of those which have been found suitable in Europe. The demand in India is for light and simply constructed implements, capable of being repaired locally, and suitable for bullock traction. For these reasons, in addition to that of their cost, heavy European implements have in most cases been found unsuitable for India. The agricultural associations which have been formed in the various provinces have given much help in the introduction of useful implements and machines, while the agricultural shows and exhibitions that are being held all over India have also been instrumental in popularising their use. In certain provinces, owing to the increasing cost of labour, the need for labour-saving appliances becomes greater every year.

In the Punjab as many as 72 reapers were sold in 1908–9, each costing 255 rupees (£17), and the new machines have mostly gone to the same districts as those bought in the previous year. Co-operative purchasing has increased considerably, the number of partners ranging from three to as many as ten. A new type of winnower designed for dealing directly with the *bhusa* and grain mixture on the threshing-floor has been tried by the Department of Agriculture with excellent results. The problem of implements for wheat threshing has been left in the hands of private engineering firms. Experiments made by the Department at Lyallpur, however, have led to the hope that it may be possible to produce a moderately cheap bullock-power threshing machine that might become popular. A light furrow turning plough, costing from 26 rupees 8 annas to 30 rupees (£1 15*s.* to £2), has been found a success, as also a specially designed spring tooth harrow.

In the United Provinces the principal demand is for low chain-

pumps and ploughs. In the Southern Circle of the Central Provinces, chain-pumps, bullock-gears, and turn-wrest ploughs have been selling well, while in the Northern Circle there has been a brisk demand for winnowers. In Bombay, the chief descriptions of implements distributed are ploughs, chain-pumps, and chaff-cutters. In Bengal, the use of the Meston plough has extended considerably. In Burma, an improved type of angle harrow has been found very suitable for the black cotton soil. In this province there is much need for a simple appliance for harvesting ground nut.—(*Board of Trade Journal,* April 20th, 1911.)

**Demand for Fencing Material in South Africa.**—A report by the Canadian Trade Commissioner at Durban states that the trade in fencing material in South Africa is most important, and is capable of expansion. An immense amount remains to be done before all the farms are properly fenced along the boundaries, and, as the tendency is towards subdividing the land, new boundaries will be formed. In addition to this, the progressive stock farmers are increasingly realising the advantage of dividing their grazing areas into camps.—(*Board of Trade Journal,* April 20th, 1911.)

**Agricultural Machinery in Chile.**—A report by H.M. Consul at Coquimbo, Chile (*F.O. Reports, Annual Series, No.* 4,632), states that there is an increasing demand for agricultural machinery in that district to supplement an ever-decreasing supply of farm labourers; and although the aggregate quantity of machines of late imported is still insignificant, yet a beginning has been made, and implements of European and American make are more frequently seen than formerly. Only a small proportion of the machinery comes direct to Coquimbo, however, for the bulk is transhipped from Valparaiso, where British and other foreign makers have agencies established and machinery on view. The kind of machinery in demand will be seen from a list of the specimen implements exhibited at a show in 1910, which included threshing, winnowing, and binding machines with and without motors, hay presses, drills, mowers, reapers, harrows, ploughs, horse shovels, chaff-cutters, farm tools, dairy implements, barbed wire, and light windmills for pumping.

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## Notes on Agriculture Abroad.

**Budget of the United States Department of Agriculture for 1911-12.**—The Budget of the United States Department of Agriculture for the year ending June 30th, 1912, which was approved on March 4th, 1911, amounts to £3,520,800. The expenditure is two and a half times that sanctioned for the year 1905-6 (£1,394,300), and more than five times the amount for 1895-6 (£659,000).

The principal increase has taken place in the Forest Service, and of the total £483,000 represents the amount paid in salaries of foresters and other officials; while the general expenditure on the forest service, including experiments in connection with forest fires, lumbering, timber testing and preserving, the afforestation of treeless regions, the maintenance of nurseries, collection of seed, planting, and other expenses in connection with the various national forests amounts to £565,500; while £104,200 is provided for the improvement of the national forests

by the construction and maintenance of roads, bridges, telephone lines, and other permanent improvements.

The amount allotted to the Bureau of Plant Industry includes £97,000 for the investigation and control of plant diseases (£73,000 for the cotton boll weevil); £34,300 for the improvement of grazing lands and the encouragement of improved methods of farm management; £29,800 for dry farming experiments and the utilisation of reclaimed land; £118,000 for the investigations and improvement of various crops, including breeding, seed testing, methods of production and sale; and £60,400 for the purchase and distribution of valuable plants and seeds.

The chief items in the expenditure sanctioned for the Office of Experiment Stations are £331,800 for the establishment of and contributions towards the maintenance of experiment stations, including some administrative expenses in connection therewith, £3,100 for nutrition investigations, and £41,700 for irrigation and drainage investigations.

Excluding the amount paid in salaries, the chief expenses of the Bureau of Animal Industry are for the inspection and quarantine of animals, £137,000; eradication of southern cattle tick, £52,100; dairying experiments, £31,250; animal husbandry experiments, £9,900; investigations in connection with animal diseases, £16,400; and co-operative experiments in breeding and feeding, £10,400.

The expenses of the Bureau of Chemistry include £127,100 for the enforcement of the Food and Drugs Act, which came into force in 1906; and those of the Bureau of Entomology, £51,600 for investigations of insects and £59,300 for action against the gypsy and brown-tail moths. The Office of Public Roads is a section of the Department which has been established to inquire into systems of road-making, materials, management, construction, &c., and to give expert advice thereon.

The expenses of the various divisions of the Department are given below, together with the figures for 1905–6, as the comparison shows the directions in which the expenditure has been chiefly extended :—

| | 1911–12. £ | 1905–6. £ |
|---|---|---|
| Office of the Secretary ... ... ... ... | 57,600 | 23,000 |
| Weather Bureau ... .. ... ... | 333,400 | 290,200 |
| Bureau of Animal Industry ... ... ... | 344,700 | 320,800 |
| ,, Plant Industry ... ... ... | 429,500 | 161,800 |
| Forest Service ... ... ... ... ... | 1,152,700 | 182,300 |
| Bureau of Chemistry ... ... .. ... | 200,800 | 32,300 |
| ,, Soils... ... ... ... ... | 54,600 | 42,600 |
| ,, Entomology .. ... ... ... | 125,400 | 23,900 |
| ,, Biological Survey ... ... .. | 29,100 | 10,800 |
| Division of Accounts and Disbursements ... | 20,300 | 6,700 |
| ,, Publications ... ... ... | 43,700 | 51,400 |
| Bureau of Statistics ... ... ... ... | 48,250 | 41,900 |
| Library ... ... ... ... ... ... | 8,400 | 4,400 |
| Office of Experiment Stations... ... ... | 388,300 | 191,200 |
| ,, Public Roads... ... ... ... | 33,500 | 10,400 |

**Budget of the Belgian Ministry of Agriculture for 1910.**—Provision was made in the Belgian Budget of 1910 for an expenditure on agriculture of £508,000. Of this amount, £9,500 was extraordinary or non-recurring expenditure. The recurring expenditure of £498,500 was made up of the items which are shown in the statement on the following page (*Bulletin du Ministère de l'Intérieur et de l'Agriculture,* January—August, 1910) :—

| | £ |
|---|---|
| Salaries and expenses of staff at central office and pensions ... | 12,000 |
| Salaries and expenses of State agronomists in connection with the inspection of agriculture ... ... ... ... ... | 7,000 |
| Compensation and other expenses in connection with the slaughter of diseased animals; expenses of the veterinary service ... ... ... ... ... ... ... ... | 113,000 |
| Subsidies to agricultural committees, associations and exhibitions; and expenses of higher agricultural council ... ... | 12,000 |
| Veterinary education ... ... ... ... ... ... | 9,000 |
| Agricultural education ... ... ... ... ... ... | 23,000 |
| Experimental and research work ... ... ... ... | 4,000 |
| Expenses of higher horticultural council. Subsidies to horticultural associations. Subsidy to the International Agricultural Institute ... ... ... ... ... | 3,000 |
| Collection of agricultural statistics ... ... ... ... | 3,500 |
| Horticultural education ... ... ... ... ... | 8,000 |
| Expenses of State Botanical Garden ... ... ... ... | 5,000 |
| Chemical and Bacteriological Institute. State analytical laboratories ... ... ... ... ... ... ... | 11,000 |
| Forestry and fishery expenses ... ... ... ... ... | 48,000 |
| Public health ... ... ... ... ... ... ... | 76,000 |
| Roads, waterways, tramways and carriage of goods ... ... | 162,000 |

**Live Stock Census in the Netherlands.**—Until 1904 the annual agricultural statistics of the Netherlands included statistics of live stock; but in that year it was decided that the annual returns of live stock should be replaced by a periodical census, in order that the returns might be made with greater accuracy than was the case in the annual statistics.

The first periodical census was taken between May 20th and June 30th, 1910. The results are given below, together with the average of the five years, 1900–4, taken from the annual statistics:—

| | Census. 1910. | Average. 1900–1904. | Increase. |
|---|---|---|---|
| Horses ... ... | 327,377 | 298,351 | 29,026 |
| Cattle ... ... | 2,026,943 | 1,661,903 | 365,040 |
| Sheep ... ... | 889,036 | 698,604 | 190,432 |
| Goats... ... ... | 224,231 | 173,392 | 50,839 |
| Pigs .. ... ... | 1,259,844 | — | — |

It should be borne in mind that the annual statistics gave the numbers of live stock in December, while the census of 1910 refers to June. This difference has but small importance in the case of horses, but in the case of cattle, it has been calculated that the number existing in June generally exceeds the number in December by about 106,000.

The poor supply of forage in 1909, however, was the cause of the exportation or slaughtering of 133,000 more animals than in 1908. As a certain compensation is brought about by these figures, it may be considered that the census of 1910, despite the difference in the date of collection of the data, gives a fairly exact idea of the increase which took place in the number of cattle.

The number of sheep is much larger in June than in December, as the lambing season is in March and April, and a large number of lambs and sheep are sold for slaughtering in autumn. In the report which accompanies the census returns of 1910 it is stated that, despite the considerable increase shown in the number of sheep, it is probable that the diminution which has been evident in previous returns has

also continued since 1904. (*Bulletin of Agricultural Statistics, Int. Inst. Agric., April,* 1911.)

**Method of Estimating the Production and Consumption of Wheat in Canada.**—An account of the method in use for the estimation of the figures relating to the production and surplus stocks of wheat in Canada is published in the *Census and Statistics Monthly* for March, 1911.

The estimates of production are based upon returns of reliable agricultural correspondents, and any tendency to exaggeration or to too sanguine estimates is carefully guarded against. The surplus stock is calculated by deducting from the figures of production so obtained the exports of wheat and flour, the requirements for seed, and the consumption of wheat in the Dominion. The method will be seen by reference to the following table, relating to the fiscal years 1908–9, 1909–10, and 1910–11 :—

| | 1908–09. | 1909–10. | 1910–11. |
|---|---|---|---|
| | bushels. | bushels. | bushels. |
| Estimated production ... ... ... | 112,434,000 | 166,744,000 | 149,989,600 |
| Imports for home consumption of wheat and flour ... ... ... | 224,000 | 200,000 | 336,000 * |
| | 112,658,000 | 166,944,000 | 150,325,600 |
| Exports of wheat and flour ... ... | 57,104,000 | 63,785,000 | 61,000,000 * |
| Balance retained for home consumption, seed, etc. ... ... ... | 55,554,000 | 103,159,000 | 89,325,600 |
| Seed ... ... ... ... ... | 13,563,000 | 16,266,000 | 18,813,000 |
| | 41,991,000 | 86,893,000 | 70,512,600 |
| Consumption at 6·24 bush. per head ... | 44,833,000 | 46,736,000 | 48,578,000 |
| Deficiency or surplus ... ... ... | −2,842,000 | 40,157,000 | 21,934,600 |

* Estimated.

In the foregoing statement the requirements for seed are reckoned at the average rate of 1·75 bushel per acre upon the acreage of the following year, while the estimate of consumption at the rate of 6·24 bushels is based upon the statistics of production at the census of 1901 and the imports and exports of that year, the population of Canada being estimated as 7,184,744 in 1908–09, 7,489,781 in 1909–10, and 7,784,900 in 1910–11.

The table shows a deficiency for 1908 which would have to be made good from the stocks held over from 1907, of which there is no record. In 1909 a proportion of the surplus would be required to replenish depleted stocks in the elevators and mills; and in this connection it will be noticed from the table that while the production of 1909–10 is 54,000,000 bushels in excess of 1908–09, the export is only about 7,000,000 more.

It may be reckoned that about 5 per cent. of the total production, as above estimated, should be deducted owing to losses in cleaning, &c., and if we put the average losses from frosted and other grain used for feeding at 3 per cent., a total reduction of 8 per cent. reduces the above

surpluses by 13,340,000 bushels, or to 26,817,000 bushels in 1909–10, and by 11,999,000 bushels or to 9,936,000 bushels in 1910–11.

**Value per Head of Live Stock in the United States.**—The rise in the value of live stock on farms in the United States during the past twenty years is shown in the following table, compiled by the Bureau of Statistics of the United States Department of Agriculture from the reports of its agents and correspondents, giving the value per head of farm animals of all ages on January 1st in each of the years mentioned (*U.S. Crop Reporter,* February, 1911) :—

| Animals. | 1911. | | 1910. | | 1909. | | Average 1900–1909. | | Average 1890–1899. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | £ | s. | £ | s. | £ | s. | £ | s. | £ | s. |
| Horses ..... ... ..... | 23 | 5 | 22 | 11 | 19 | 19 | 15 | 0 | 10 | 1 |
| Mules..... . ..... | 26 | 3 | 24 | 19 | 22 | 9 | 17 | 14 | 12 | 5 |
| Milch Cows ..... | 8 | 9 | 7 | 9 | 6 | 15 | 6 | 6 | 4 | 17 |
| Other Cattle ..... | 4 | 7 | 4 | 1 | 3 | 13 | 3 | 15 | 3 | 9 |
| Sheep..... | | 16 | | 17 | | 14 | | 13 | | 9 |
| Swine..... | 1 | 19 | 1 | 18 | 1 | 7 | 1 | 7 | 1 | 0 |

**Nitrate Industry of Chile.**—According to a report by H.M. Consul at Antofagasta (*F.O. Reports, Annual Series, No.* 4,633), the present condition of the nitrate industry of the district may be considered as satisfactory and its prospects exceptionally good, as the demand for nitrate of soda is steadily increasing year by year. Most producers feel that a still further improvement could be reached by combining with a view to selling the article direct to the consumer in the various centres at a fixed and uniform price, and thus do away with the present speculative operations. It is felt that stability in price would do a great deal towards furthering the employment of nitrate as a fertiliser, and that a slightly better price to the producer could be expected under such conditions. Tentative proposals have been put forward in this direction, but so far no definite line of action has been decided upon.

In 1909 a total sum of £88,400 was expended on propaganda in the chief countries of the world for making known the advantages of nitrate as a fertiliser, of which sum the Chilian Government contributed £40,000. The steady increase in the yearly consumption throughout the world is shown in the following figures :—

CONSUMPTION OF NITRATE OF SODA FOR THE YEARS 1906–10.

| | 1906. | 1907. | 1908. | 1909. | 1910. |
|---|---|---|---|---|---|
| | tons. | tons. | tons. | tons. | tons. |
| Europe ... ... | 1,275,000 | 1,279,000 | 1,412,000 | 1,497,000 | 1,690,000 |
| United States ... | 364,000 | 362,000 | 317,000 | 418,000 | 583,000 |
| Other countries ... | 40,000 | 46,000 | 52,000 | 71,000 | 17,000 |
| Total ... ... | 1,679,000 | 1,687,000 | 1,781,000 | 1,986,000 | 2,290,000 |

The month commenced with both temperature and rainfall below the average, and ended with a generally high temperature and heavy rainfall.

**Notes on the Weather in April.**

During most of the *first* week (March 26th to April 1st), the weather over the greater part of the country was dry, and temperature was below the average except in Scotland N. and England N.W., although warmth was everywhere classed as "moderate." The amount of bright sunshine recorded was scanty in the eastern and midland counties of England.

A heavy rainfall which occurred in the south-east of England at the end of the first week continued into the beginning of the *second* week. Over the whole week, however, rainfall was less than the average except in the English Channel. In the middle and end of the week, the general character of the weather was very wintry, warmth being either "deficient" or "very deficient," the deficit from the normal reaching 8° in England S.E. Bright sunshine was also less than the normal generally.

The weather improved during the *third* week, and was fair to very fine over Great Britain generally, although a good deal of cloud prevailed in Scotland and the north-east of England. There was a considerable rise in temperature, unusual warmth being experienced in Scotland and England N.E. Rainfall continued below the average, "very light" falls being recorded in the midland and north-western counties, and no rain falling in England S.W. Bright sunshine exceeded the average except in Scotland and England N.E.

The weather during the *fourth* week continued fair or fine in the east and south of England, and over a considerable portion of the Midlands, but in Scotland and the western districts of England rain fell very frequently. Warmth was "unusual" in the eastern, midland, and north-western districts of England, and "moderate" in the south-eastern and south-western districts; the excess above the average was as much as 5° in England E. and N.E. "Scanty" sunshine was recorded over Scotland and England N.W. and S.W., and "moderate" sunshine in the other parts of England.

In the *fifth* week, the conditions were unsettled and showery throughout the country, and the sky was seldom free from cloud. "Very heavy" rainfall was experienced in England N.W. and S.W., and in Scotland W. and elsewhere the fall was "heavy." The excess, however, was more moderate in the east of England than in the rest of the country. In all districts temperature was above the average, although the excess was not large, and bright sunshine was below the average.

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**Notes on Crop Prospects Abroad.**

The International Institute of Agriculture, in its Bulletin of Agricultural Statistics for April, 1911, gives the condition of the autumn and winter sown cereals in various countries on April 1st, 1911, compared with the condition on the same date in 1910, as in the table on the next page.

It is explained that, although given in numerical form, these expressions of the conditions are necessarily only approximate, being

based solely upon the appearance of the vegetation, which is sometimes deceptive.

It should further be noted that, when the condition of the crop is expressed by, say, 120, no matter how carefully this judgment may be made, nor how great an expert may be the person judging the condition, this does not mean that an outturn ⅕ greater than the average *will be obtained,* but only that the present condition is *such as to predict* a yield ⅕ above the average. The present condition may change from one moment to another, and the numerical expression must then also change. For example, the condition of a certain crop to-day is such

| | Wheat. | | Rye. | | Barley. | | Oats. | |
|---|---|---|---|---|---|---|---|---|
| | April 1st, 1911. | April 1st, 1910. | April 1st, 1911. | April 1st, 1910. | April 1st, 1911. | April 1st, 1910. | April 1st, 1911. | April 1st, 1910. |
| Belgium ... | 105 | 90 | 110 | 95 | 105 | 95 | — | — |
| Denmark ... | 104 | 97 | 108 | 97 | — | — | — | — |
| Spain ... ... | 105–110 | — | 105–110 | — | 105–110 | — | 105–110 | — |
| Luxemburg ... | 100 | 90 | 100 | 95 | 102 | 94 | 100 | — |
| Netherlands ... | 108 | 110 | 111 | 105 | 108 | 110 | — | — |
| Sweden ... | 100–110 | 100 | 95–100 | 100 | — | — | — | — |
| Switzerland ... | 95 | 96 | 94 | 92 | 100 | 103 | — | — |
| Japan ... .. | 100 | 98 | — | — | 100 | — | — | — |

(100=average yield of past ten years. Particulars of the areas sown in the autumns of 1910 and 1909 were given in the *Journal* for March, p. 1037.)

as to give hope of a yield 20 per cent. above the average, and this condition is represented by 120. A fortnight later, floods or insect pests may make this estimate fall to 90 per cent. of an average yield, which means that at the end of this fortnight the condition is represented by 90.

The following supplementary information as regards the condition of the autumn-sown crops in various countries not included in the above table is also given :—

*United States of America.*—The following table shows the conditions of winter wheat and of rye on April 1st, 1911, expressed in a percentage of a "normal" condition :—

| Crop. | Conditions on April 1st. | | |
|---|---|---|---|
| | 1911. | 1910. | Average 1901–1910. |
| Winter wheat..... | 83·3 | 80·8 | 86·9 |
| Rye ..... ..... ..... | 89·3 | 92·3 | 90·2 |

*France.*—Weather conditions were exceedingly favourable during the first three weeks of March. The spell of cold weather during the last days of March proved of short duration, and the crops are now strong enough to resist any further attack of ungenial weather. On

April 1st the conditions of wheat, barley, and oats were good, and of rye, average.

*Hungary.*—Though the winter has been long, and little snow has fallen to protect the crops, they have only slightly suffered, and progressed well during the mild weather in March. Damage caused to cereal crops by mice: 7·2 per cent. of the total area sown. Damage caused to cereal crops by frost: 3·1 per cent. of the total area sown. Area resown: 2·8 per cent. of the total area sown.

*Italy.*—The condition of the winter cereals is good almost everywhere.

*Roumania.*—The condition of wheat and rye is good, of barley average, and of oats excellent. Weather conditions are favourable.

*Russia in Europe.*—Though the past winter has proved a cold one, it has not unfavourably affected the wheat crop, except in the south-east of the country. Snow has been relatively scarce, and disappeared in the south and south-east (Government of New Russia) by the beginning of March. In the rest of European Russia the crops were still under snow at this date.

*Tunis.*—On April 1st the condition of wheat, barley, and oats was good.

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*Germany.*—The report of the Imperial Statistical Bureau gives the condition of the crops in the middle of April as follows:—Winter wheat, 2·7; winter rye, 2·8 (2=good, 3=average). Considerable damage from mice was reported from some districts, and it is feared that their ravages will be extended in the immediate future. On the whole, the condition of the winter-sown crops is not especially favourable.

*France—Damage to Crops by Frost.*—According to a dispatch, dated April 20th, received from H.M. Consul-General at Marseilles, great damage was caused to the crops in the south of France by the frosts which occurred early in April. The fruit crops have either suffered severely or been entirely lost in the Departments of Bouches-du-Rhône, Gard, Hérault, Vaucluse, Ardèche, Pyrénées Orientales, and Var. In the Basses-Alpes, Vaucluse, and Ardèche, almonds have suffered. Vegetables have been destroyed in Bouches-du-Rhône, and Gard; potatoes have been damaged in Vaucluse.

*Production of Cider and Perry in France.*—According to the report of the French Ministry of Agriculture, the production of cider and perry in France during 1910 is estimated at 237,485,000 gallons, as compared with 174,861,000 gallons in 1909 (*Journal Officiel*, December 22nd, 1910).

*Austria.*—The Ministry of Agriculture gives the condition of the crops in the middle of April as follows:—Wheat, 2·6; rye, 2·9; barley, 2·8; oats, 2·6 (2=over average, 3=average). Wheat and rye have come through the winter well, but are backward owing to the cold weather at the beginning of April. The young shoots of late-sown plants, especially rye, have suffered from frost. The unfavourable weather also delayed spring sowings of barley and oats.

*Fruit Crop of Austria.*—The fruit crop was reported to be in a healthy condition at the end of March, owing to the absence of winter frosts, especially in the north of Austria. The damage caused by frost to the young shoots in more exposed districts is unimportant.

The formation of wood is quite satisfactory. The blossoming is backward on account of the cold weather of March. (*Statistische Nachrichten,* April 11th, 1911.)

*Argentina.*—H.M. Chargé d'Affaires at Buenos Aires reports that there were heavy rains at the end of February which were of great benefit, improving the prospects of late-sown maize, and enabling field work to be proceeded with. Only slight rains occurred, however, throughout March.

*Bulb Crop of Netherlands.*—H.M. Consul at Amsterdam reports that, according to the *Handelsblad,* the bulbs in the Lisse district were seriously damaged by the frosts in the early part of April. The extent of the damage could not be estimated, but it was feared that the crop would be a total failure. Similar reports have been heard from bulb growers in the neighbourhood of Haarlem.

The President of the Local Florists' Association of Lisse, however, in a communication of April 20th to H.M. Consul, calls in question the accuracy of the above statements, and reports that the hyacinths in the district of Lisse look excellent; the early flowers were killed by frost, which, however, did not hurt the leaves, and a good crop is expected.

Further statements in the *Handelsblad* also indicate that the damage due to frost was overestimated, and the prospects for hyacinths and other bulbs are now considered to be good, both as regards quality and quantity. (*Board of Trade Journal,* April 13th and 27th, and May 4th, 1911.)

*Russia.*—A report by the official *Commercial Gazette* of St. Petersburg, of April 16th, on the condition of winter grain in South Russia in the middle of April, has been forwarded by H.M. Commercial Attaché at St. Petersburg. The report states that as a result of the meteorological conditions prevailing and of the very late appearance of spring, the condition of winter grain in the south of Russia, so far as it is yet possible to report, gives rise to no anxiety. In general the reports are fully satisfactory, rye especially having suffered less than other grains from change of weather. Wheat in places is not quite so satisfactory.

*Bulgaria.*—The *Nachrichten für Handel* (Berlin) of April 20th publishes the following crop report for Bulgaria :—

The weather in Bulgaria during the past winter has not been particularly favourable to the development of winter seeds. During the early part of the winter the weather was extremely mild and damp, with little snow, and not until the second half of January were there any strong winds and severe cold. In the north-east districts of Bulgaria, however, heavy falls of snow protected the seed from frost, but in other parts of the country there was little snow, and it did not remain long on the ground. Owing to the mild weather in March the prospects are at present very good for spring seeds. The vineyards and orchards are in good condition and have not suffered from frost.

*United States.*—The Crop Reporting Board of the Bureau of Statistics of the Department of Agriculture estimates, from the reports of its correspondents, the area under winter wheat on May 1st as 31,367,000 acres, as compared with 29,044,000 acres and 27,871,000 acres on the corresponding dates in 1910 and 1909. The average con-

dition on May 1st is given as 86·1 against 82·1 on May 1st, 1910, 83·5 on the same date in 1909, and 86·1 the mean of the averages of the past ten years. Indications point to a yield of 15·6 bushels per acre, and a crop about 5·4 per cent. larger than last year.

The average condition of winter rye on May 1st is given as 90·0, the condition on corresponding dates in 1910 and 1909 being 91·3 and 88·1 respectively. (*Dornbusch,* May 8th, 1911.)

*Hungary.*—The Hungarian Ministry of Agriculture, reporting on the condition of the crops on April 25th, states that the warm windy weather in the latter part of April caused dryness of the soil, which was unfavourable to the development of the autumn and spring-sown cereals. A mild rain is needed.

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**Crop Conditions on May 1st.**

The Crop Reporters of the Board, in reporting on agricultural conditions on May 1st, state that the very cold and mostly dry weather of the first part of the month checked vegetation generally, but that the rains and more seasonable temperature at the end of the period induced considerable improvement in the prospects. No damage to the corn crops from the severe weather at the beginning of the month is reported; but, as a result, the season may be regarded as being somewhat late on May 1st. Wheat is looking healthy, though backward in many districts; that sown earliest in the autumn, of course, presents the more satisfactory appearance. Much the same may be said of barley and oats, both of which are looking well, except that poor reports are received concerning oats in Kent. Sowing is, in both cases, practically finished over the greater part of England, but a good deal had still to be done in the north; in Scotland work was very forward. Beans are healthy and vigorous, and promise well, although, like the other crops, they are backward in many districts. Peas seem, as a rule, fairly satisfactory.

The season for planting potatoes has proved very favourable nearly everywhere (except in the extreme south-east), and the seed has gone into the ground under good conditions. The work is well forward in all the important potato districts; practically completed in some. From Lincoln comes a report that, owing to the high prices, the area under this crop is this year being increased. The early crop in Cornwall is reported to have been severely damaged by frost.

Sowing of mangolds was generally in full swing and being carried out under good conditions, although in many places the weather had not proved suitable till towards the end of the month, so that in such districts this operation was somewhat behindhand.

There is generally abundance of blossom on all kinds of fruit trees. The more noteworthy exceptions are Norfolk, where the cold winds have kept back the orchards and bush fruits, parts of Lincoln, where gooseberries have been badly damaged, and Kent and Surrey, where early gooseberries have been injured. Elsewhere the severe frosts at the beginning of the month appear to have come too early to effect any material injury.

"Seeds" are generally healthy, the rain at the end of the month having been of great benefit, although more is still required. There

is, however, very general mention of a scarcity of clover plants (except in Scotland); and sainfoin also appears to be a thin or weak crop. Pastures were everywhere short of grass at the middle of April, and live stock out at grass consequently did not thrive particularly well; in this case also, however, the rains and more genial temperature at the close induced growth and a general improvement.

Except in the hilly districts, lambing is mostly now finished in England. In the central belt of England the fall of lambs has hardly been over average, while the severe weather at the beginning seems to have caused somewhat heavier losses than usual among ewes or lambs. In the lowlands of the north of England, Wales, and in Scotland, the fall of lambs is about average or in some places more, especially in Scotland. In the hills, lambing is mostly just beginning, and it is too early to report anything definite; but where it is more advanced in the north of England, moorland ewes are reported to be lambing indifferently, and there is considerable mortality.

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**Agricultural Labour in England during April.**

The Board of Agriculture and Fisheries have been furnished by the Board of Trade with the following report, based on returns from correspondents in various districts, on the demand for agricultural labour in April:—

Agricultural employment was generally regular throughout April, and there was a fair demand for men outside the regular farm staff for such work as hoeing, carting manure, preparing the land for root crops, planting potatoes and threshing. The supply of such men was usually sufficient for the demand, but mention of a surplus in the reports was exceptional. Men for permanent situations, especially where the work involved Sunday duty, were again reported as scarce in parts of the Midland, and more particularly the Southern and South-Western Counties.

*Northern Counties.*—There was not much demand for extra labourers in *Northumberland* and *Durham,* but outside these counties such men were generally in fairly good demand, though their employment was somewhat interrupted by bad weather in the western districts. With the exception of the Bridlington and Norton Rural Districts in *Yorkshire,* where a surplus of extra labourers was reported, the supply of these men was usually balanced by the demand in the districts reported on. There was a surplus of men for permanent situations in the Patrington Rural District (*Yorkshire*). No general change in wages was reported at the hiring fairs for farm servants which took place in *Durham.*

*Midland Counties.*—Extra labourers in these counties were usually in regular employment, though some men lost a little time at the end of the month through rain. The principal operations at which such men were employed were carting manure, threshing, hoeing, planting potatoes, and cleaning the land for root crops. Some scarcity of men for permanent situations was again reported in several districts.

*Eastern Counties.*—There was a fairly good demand on the whole for extra labourers in these counties, which arose chiefly from such work as hoeing, cleaning fallows for turnips and mangolds, carting

manure, and threshing, and little or no time was lost by men through bad weather. The supply of and demand for labourers were usually about equal, but some scarcity of men was reported in the Welton and Spilsby (*Lincolnshire*) and Orsett (*Essex*) Rural Districts, while there was a surplus of men in the Newmarket (*Cambridgeshire*), and the Henstead and Thetford (*Norfolk*) Rural Districts, and in part of the Thingoe (*Suffolk*) Rural District.

*Southern and South-Western Counties.*—Hoeing, carting manure, planting potatoes, cleaning the land for root crops, threshing, and hedging provided a fair amount of work for extra labourers, and the weather being unusually fine, most men were in regular employment throughout the month. Several correspondents mentioned that there was less hoeing to be done than usual on account of the dry weather, but there was no marked surplus of labourers in any of the districts reported on. Men for permanent situations were reported as scarce in a number of districts, particularly where the work involved Sunday duty, like milking.

## THE CORN MARKETS IN APRIL.

C. KAINS-JACKSON.

The depression which marked the grain trade up to the close of March continued until after the Easter holidays, but trade was very active in the last week of the month. The business for actual consumption was also much increased, and prices were altered in holders' favour for nearly all the principal staples.

*Wheat.*—Many local markets have continued to record an average a little below thirty shillings, but London has shown improvement in value, closing half a crown above the thirty shilling level. India, with a larger crop than in 1910, has not hurried shipments forward, 421,000 qr. constituting the April clearances for 1911, as compared with 504,000 qr. for April, 1910. The average price is about 35*s.* per 492 lb. Canadian wheat has been forthcoming in fair quantity, the closing price being 38*s.* 6*d.* for best quality. The wheat shipments of North America were 665,000 qr., but these returns do not distinguish Canadian from United States exports. The large supply of Australian has kept that sort from more than 9*d.* advance, 37*s.* against 36*s.* 3*d.*, but Russian, American red, and also Argentine have been 1*s.* to 1*s.* 3*d.* dearer. The Russian shipments for April were 1,859,000 qr., and Europe S.E. sent off 677,000 qr.; total for this region, 2,536,000 qr. In April, 1910, Russia shipped 2,731,000 qr., Europe S.E. 190,000 qr.; total 2,921,000 qr.

*Flour.*—Standard flour has continued to sell well, the sale helping in the disposal of much flour which was satisfactory in condition and stamina but below an average in colour. The closing prices of April were 32*s.* for top-price American, 31*s.* for top-price London, and also Canadian, 29*s.* for Town whites and best Country, 26*s.* for No. 1 Households, 24*s.* 6*d.* for No. 2 Households, 27*s.* for London Standard, 24*s.* 9*d.* for Country Standard, and 40*s.* for Hungarian. It will be noted that the last-named top-quality pastry sort is decidedly dearer,

and we hear of bakers making an increased use of "London-made by Hungarian process," the price of which is 32*s.* per sack. North American shipments for April were 609,000 sacks, and 180,000 sacks were on passage on the last day of the month.

*Barley.*—The price of British showed little improvement on the month, but the closing markets were in sellers' favour, and a definite advance in May was regarded as not improbable. From the 24th to the 29th Russian barley led the way with fully 1*s.* rise, and the trade in 448 lb. kinds showed 6*d.* to 9*d.* improvement. Closing prices were 30*s.* to 32*s.* for Californian brewing; 32*s.* to 34*s.* for screened Anatolian; 27*s.* for Roumanian, all per 448 lb.; 22*s.* to 22*s.* 6*d.* for Russian; 21*s.* 6*d.* to 22*s.* for Persian, each per 400 lb. Barley shipments in April were 1,745,000 qr. from Russia, 279,000 qr. from Europe S.E., and 9,000 qr. from California. There were on the 30th 330,000 qr. on passage, viz., 25,000 Russian, 25,000 Anatolian, and 280,000 Californian. Average expectations include a much larger proportion of feeding barley.

*Oats.*—British oats, as usual in April, showed a tendency to advance in price, especially at Mark Lane, to which fine and heavy samples have a tendency to gravitate. The New Zealand oats arriving during April also sold increasingly well. The total supply of oats on passage is very heavy, but includes singularly little heavy corn; indeed, 90 per cent. of the expected arrivals are regarded as likely to weigh 304 lb. only to the quarter. The rise on the month in Russian was 1*s.*, and in Argentine 6*d.*, these types closing at 15*s.* 6*d.* and 15*s.* for f.a.q. The Russian sort has appreciated more than the Argentine for quality reasons; it is in most cases the better sample at the same weight. The chief rival shippers in April sent off: Russia, 928,000 qr., Argentine, 792,000 qr.

*Maize.*—Reference was made a month ago to the exceptional cheapness of this staple, to the moderate quantity on passage, and to the small reserves in the port warehouses. Those who drew conclusions from these facts and had capital enabling them to act are now more fortunately placed than those who have maize to buy on a risen and rising market. At the close of April 22*s.* 6*d.* to 23*s.* ruled for American, 24*s.* to 24*s.* 6*d.* for Roumanian, 23*s.* 6*d.* to 23*s.* 9*d.* for South Russian, 25*s.* to 25*s.* 3*d.* for Argentine, and 26*s.* to 27*s.* for South African, a sort which at present is in more demand than supply. April shipments were 788,000 qr. from North America, 24,000 from South America, 422,000 from Russia, 509,000 from Europe S.E., and 25,000 from South Africa. Small quantities were also shipped by India and Burma. On the 30th only 260,000 qr. were on passage. The Argentine harvest was estimated by a leading trade firm as having yielded 2,350,000 qr., available for export, against 11,743,000 qr. actually exported in 1910. The market naturally closed with especial firmness for the yellow sort, for which we principally depend on the River Plate.

*Oilseeds.*—Egypt from September 1st, 1910, to April 30th, 1911, shipped 416,000 tons of cottonseed, against 182,000 tons last season, yet on the 30th £8 3*s.* 9*d.* per ton was paid in London. An exceptionally vigorous demand is thus disclosed. Indian seed made £6 per ton, which, as the two sorts are averaged at £2 per ton quality

difference, is a comparatively depressed price. The linseed market at Buenos Aires fell 3*s.* per qr. on the month, but only 229,000 qr. were shipped, while India showed more relative firmness, yet managed to ship 508,000 qr. It will be manifest that the whole trade in these much-needed feeding stuffs and fattening foods is quite unsettled, and that no forecast can usefully be attempted. On the 30th there were 172,000 qr. of linseed and 30,000 tons of cottonseed on passage to the United Kingdom.

*Various.*—Soy beans are costing about seven guineas per ton, of which £1 6*s.* goes for freight and insurance, and £6 1*s.* remains for grower and merchant. The demand, though still excellent, is not quite what it was in 1910, the year succeeding the "discovery" of these beans, as highly valuable fattening feeding stuffs. Beet sugar has declined 2*d.* per cwt., but many expect a recovery shortly. Indian peas are in unusually large offer, and at 6*s.* per cental for sound white are a good bargain. Lentils from India vary much in type and value, so that prices in turn range from 5*s.* to 6*s.* per cental. The price of gram, 5*s.* per cental, makes this staple, which is botanically very much the same as our chick pea, an article strongly to be recommended, seeing that its Indian drawback—it causes a partial paralysis of animals fed on it exclusively and for a long period—is not one within the range of probable occurrence in this country. Indian dari at 24*s.* per 480 lb., Argentine canaryseed at 44*s.* per 464 lb., screened, and good Burmese hand-picked haricot beans at 37*s.* per 504 lb., are among the minor staples for which at prices asking there should, on feeding value, be a steady demand.

## THE LIVE AND DEAD MEAT TRADE IN APRIL.

A. T. MATTHEWS.

*Fat Cattle.*—Supplies of fat cattle have been about normal as regards numbers, and above the average for quality and finish; indeed, at a large number of markets the quality has been described as excellent. This was certainly the case in London, where it was by no means uncommon for prime Norfolk Shorthorns to realise over 40*s.* per live cwt. Prices have varied but little throughout the month, but they have been decidedly better than those of March, as will be seen by the following averages:—Shorthorns averaged 8*s.* 3¼*d.*, 7*s.* 7*d.*, and 6*s.* 6½*d.* for the three qualities, against 8*s.* 0¼*d.*, 7*s.* 4½*d.*, and 6*s.* 4*d.*; Herefords, 8*s.* 6*d.* and 7*s.* 11*d.*, against 8*s.* 3½*d.* and 7*s.* 8*d.*; Devons, 8*s.* 5½*d.* and 7*s.* 8½*d.*, against 8*s.* 1¾*d.* and 7*s.* 4*d.*; Welsh Runts, 8*s.* 2*d.* and 7*s.* 7½*d.*, against 7*s.* 11¼*d.* and 7*s.* 5*d.*; and Polled Scots, 8*s.* 4½*d.* and 8*s.*, against 8*s.* 1½*d.* and 7*s.* 9½*d.*, per 14 lb. stone. Roughly speaking, there was an average advance of ¼*d.* per lb. for the month in the English markets. The Scotch markets were also very firm till the last week, when some weakness was shown compared with the strong tone prevailing in England.

In the last week there were signs that the supplies of stall-fed cattle were beginning to fall off, those from Ireland being nearly finished, and as the season advances, it seems extremely probable that

prices may further advance. They are still some $7\frac{3}{4}d.$ per stone, or nearly £3 per head on bullocks of average weight, lower than in July of last year. Considerable confidence is evidently felt by graziers, who are paying very high prices for stores, and the annual lettings of grass-keeping for summer grazing are being made at high figures.

*Veal Calves.*—The scarcity of prime veal calves has continued, and those of fair merit have maintained the March averages of $9\frac{1}{4}d.$ and $8\frac{1}{4}d.$ per lb. There have been very large numbers slaughtered immaturely, and these have fetched low prices. Thousands of these calves would probably have paid well for rearing.

*Fat Sheep.*—As a large proportion of the fat sheep have been clipped and weather conditions have more or less affected the sale of those out of the wool, it is more difficult to trace with certainty any fluctuations in the real value of mutton. Downs in the wool averaged $8\frac{1}{2}d.$ for first, $7\frac{1}{2}d.$ for second, and $6d.$ for third quality, against $8\frac{3}{4}d.$, $7\frac{3}{4}d.$, and $6d.$ in March, thus showing a decline of $\frac{1}{4}d.$ per lb. The Longwools averaged $8\frac{1}{2}d.$, $7\frac{1}{4}d.$, and $5\frac{1}{2}d.$, against $8\frac{1}{2}d.$, $7\frac{1}{4}d.$, and $5\frac{3}{4}d.$ Longwools therefore sold relatively better than Downs, probably owing to the greater value of their fleeces at this season. Clipped Downs averaged $7d.$, $6\frac{1}{2}d.$, and $5\frac{1}{4}d.$ per lb. for the three qualities, and Longwools $6\frac{1}{2}d.$, $6d.$, and $4\frac{3}{4}d.$ Irish Longwools were quoted up to $9\frac{3}{4}d.$ per lb. at Liverpool in the last week of April. Owing to the wintry weather considerable losses were incurred by clipping during March and early in April, always a more or less speculative proceeding. The fear of damage to the meat by chilling deterred butchers from purchasing, and in many cases the difference in the value of the mutton of the naked sheep was greater than that of the fleece. Latterly, however, clipped sheep have sold much better in proportion, and at present prices for wool it will pay better to keep it. London buyers much prefer clipped sheep when the weather is suitable, and it often happens that the sender gets very little for the wool on the sheep's back at Islington market.

*Fat Lambs.*—The value of fat lambs has very largely depended on the markets to which they were sent, for the trade has been extremely irregular and the range of prices wide. Thus far the Metropolitan market has been quite one of the very lowest in the country. Taking thirty-seven British markets the April average was $12\frac{1}{2}d.$ for first, and $11d.$ for second quality, while the top London price was about $10\frac{1}{2}d.$ In the last week the highest price quoted was $15d.$ at Hull, several other markets reported $13d.$ and $12d.$, but in London it was only $10\frac{1}{4}d.$ for the choicest Down lambs. At Bristol, however, it was still lower, for there $9d.$ was the top price.

*Fat Pigs.*—The average price of bacon pigs in British markets was $7s.$ $3\frac{1}{4}d.$ for prime small, and $6s.$ $7\frac{1}{2}d.$ for larger pigs, showing practically no change from March values, but about $9d.$ per stone below those of October.

*Carcass Beef—British.*—The trade for British beef in London was quiet, but values were fairly steady. Scotch long sides averaged $6\frac{3}{8}d.$ and $6\frac{1}{2}d.$, and English $6d.$ and $5\frac{3}{4}d.$, per lb. Short Scotch sides fetched $6\frac{3}{4}d.$ to $7d.$

*Port-Killed Beef.*—Deptford-killed American beef averaged $5\frac{7}{8}d.$ per lb. for the best quality.

*Chilled Beef.*—As regards States chilled beef, it is noteworthy that frequently during April there was none worth quoting on the London market. Best hindquarters fetched 6¼*d.* to 6½*d.* per lb., and forequarters 4*d.* to 4¼*d.* Argentine chilled was plentiful, and a clearance of exposed stocks was often impossible. Prices were slightly lower than in March, the averages in the Smithfield Market working out at 4*d.* to 4½*d.* for hindquarters, and 2¾*d.* to 3*d.* per lb. for forequarters.

*Frozen Beef.*—The value of frozen beef gradually declined all the month, best hindquarters averaging 4*d.*, and forequarters about 2¾*d.*, per lb.

*Carcass Mutton—Fresh-Killed.*—Mutton has been very slow of sale and trade dragging for all except the smallest sizes. Very light Scotch tegs have occasionally fetched 8½*d.* per lb., but fluctuated to the extent of ¾*d.* per lb. Their average was 8*d.* Excellent Scotch mutton of very moderate weight made 7*d.*, and larger sheep 6*d.*, per lb. The value of English was 6*d.* to 6½*d.* per lb. for good West Country tegs.

*Frozen Mutton.*—This article sold at very low prices. The best New Zealand has stood for three weeks at 3¼*d.* per lb., Argentine at 3*d.*, and Australian a fraction less.

*Carcass Lamb.*—British lamb was unusually cheap, and the choicest only averaged 10½*d.* per lb., large quantities being sold at 9*d.* and under. The top price of the best frozen (Canterbury) was 5*d.*, and that of Argentine about 4¼*d.*

*Veal.*—Prime quality British varied from 8*d.* to 8½*d.* per lb., but 6*d.* was the outside value of middling carcasses.

*Pork.*—Small pigs have fetched 7*d.* to 7¼*d.*, and medium sizes 6¾*d.*, per lb. There has been a good demand for heavy sows in London at 5*d.* per lb. for sausage making.

## THE PROVISION TRADE IN APRIL.

### HEDLEY STEVENS.

*Bacon.*—Although on the whole the demand was a little better than during March, dealers are disappointed with the month's trade. In spite of the fact that prices were considerably below those current at the same time last year, the consumption was still less. Owing to the cold weather just before Easter, the demand for the holiday trade was much less than had been expected, but towards the end of the month orders were a little more free.

The arrivals from Denmark were not quite so heavy as during the previous month. Prices for this description remained steady, but agents found some difficulty in clearing up their stocks before the next shipment arrived. The imports from Russia were fairly large, and in some cases pressure was brought to bear in order to effect sales, which resulted in lower prices all round. The top price for the month was about 54*s.* per cwt., with secondary grades selling at around 48*s.* per cwt. The shipments from Holland were small, but they are likely to increase in the near future. Canada continues to ship us bacon in slightly increased quantities; prices for the month remain about unchanged.

American bacon was again cheaper, and with hogs being marketed daily in larger numbers than last year, it is anticipated that prices will

show a further reduction, and so stimulate the consumption. The average weight of the American hogs being killed is still heavy; feed being plentiful and cheap, breeders are fattening their stock for a longer time before sending to the markets. The prices for hogs at Chicago during April, 1911, ranged from $5.75 to $6.85, against $8.85 to $10.70 last year, and $6.65 to $7.50 two years ago.

English pigs were again offered in small quantities, and on some markets they show up slightly dearer on the month. Lower prices, however, are anticipated in May.

*Cheese.*—The improvement in prices reported last month continued during April, although at the end of the month, as a result of some manipulation, there were a few cheaper sellers of New Zealand cheese, as it is felt by some that any advance on last season's goods is undesirable at the opening of the Canadian season for new makes.

The consumption during the month was a little better, and with stocks small in England, still higher prices are looked for in May on all descriptions of last season's goods. Very few Canadian fodder-makes have been sold so far for shipment to this country, as the season is backward and the home demand sufficient to clear nearly all the available lots at equivalent to 56*s.*–57*s.* c.i.f.

The latest advices from Canada point to a large make during this year, as the cattle have wintered well, feed being plentiful all along. It is also reported that the United States buyers have not contracted for cream to be shipped over the border as last season, which, of course, means that more butter and cheese will be manufactured in Canada, and available for export. A few more lots of States cheese were imported during the month, but it is understood that all surplus stocks are now nearly cleared. It is some years since any quantity of full cream States cheese has been exported to England, but a fair number of shipments have been made to all ports during the last two months. New Zealand makes are going more freely into consumption. Over 3,000 crates (6,000 cheese) will arrive during May.

At the end of the month the estimated stock of Canadian cheese at the three principal distributing centres (London, Liverpool, and Bristol) were 89,000 against 114,000 at the same time last year, and 95,000 two years ago. The stock of New Zealand cheese was 31,500 crates in London and Bristol, against 51,000 crates last year.

*Butter.*—Business was mostly of a retail character, and prices show little change on the month. The arrivals from Australia were large, but on account of the delay to a steamer the deliveries of New Zealand were smaller. The demand continues chiefly for best creameries, prices being such that all consumers can afford to have the best quality. In consequence, stocks of secondary grades are still increasing, and prices favour buyers. During May the arrivals from the Colonies will be large, and prices are expected to go lower.

The home demand in America improved during the month, resulting in the low cable offers being withdrawn, although the stocks in cold store at the four principal markets (Chicago, New York, Boston, and Philadelphia) early in April were 284,764 lb. more than at the same time last year. Arrivals from Siberia are now reaching this country regularly, and the quality is very fine. Prices range from 96*s.* to 100*s.* per cwt. In Ireland the conditions are favourable for a large make.

# PRICES OF AGRICULTURAL PRODUCE.

## AVERAGE PRICES of LIVE STOCK in ENGLAND and SCOTLAND in the Month of April, 1911.

*(Compiled from Reports received from the Board's Market Reporters.)*

| Description. | England. First Quality. | England. Second Quality. | Scotland. First Quality. | Scotland. Second Quality. |
|---|---|---|---|---|
| FAT STOCK:— | per stone.* | per stone.* | per cwt.† | per cwt.† |
| Cattle:— | *s. d.* | *s. d.* | *s. d.* | *s. d.* |
| Polled Scots | 8 5 | 8 0 | 40 2 | 37 3 |
| Herefords | 8 7 | 7 11 | — | — |
| Shorthorns | 8 3 | 7 7 | 39 1 | 36 7 |
| Devons | 8 6 | 7 9 | — | — |
| | per lb.* | per lb.* | per lb.* | per lb.* |
| | *d.* | *d.* | *d.* | *d.* |
| Veal Calves | 9½ | 8¼ | 9¼ | 7¼ |
| Sheep:— | | | | |
| Downs | 8¼ | 7¼ | — | — |
| Longwools | 7½ | 6¾ | — | — |
| Cheviots | 9¾ | 8¾ | 8¾ | 7¾ |
| Blackfaced | 9½ | 8 | 7¾ | 6¾ |
| Cross-breds | 8¼ | 7¼ | 8¾ | 7½ |
| | per stone.* | per stone.* | per stone.* | per stone.* |
| Pigs:— | *s. d.* | *s. d.* | *s. d.* | *s. d.* |
| Bacon Pigs | 7 3 | 6 9 | 7 4 | 6 4 |
| Porkers | 7 9 | 7 1 | 7 9 | 6 11 |
| LEAN STOCK:— | per head. | per head. | per head. | per head. |
| Milking Cows:— | £ *s.* | £ *s.* | £ *s.* | £ *s.* |
| Shorthorns—In Milk | 22 2 | 18 9 | 21 2 | 17 9 |
| ,, —Calvers | 21 9 | 18 8 | 20 0 | 17 5 |
| Other Breeds—In Milk | 19 16 | 16 3 | 18 14 | 15 14 |
| ,, —Calvers | 14 5 | 13 5 | 19 5 | 16 2 |
| Calves for Rearing | 2 7 | 1 16 | 2 17 | 2 1 |
| Store Cattle:— | | | | |
| Shorthorns—Yearlings | 10 15 | 9 4 | 11 8 | 9 13 |
| ,, —Two-year-olds | 14 19 | 13 4 | 16 18 | 14 0 |
| ,, —Three-year-olds | 18 4 | 16 2 | 18 4 | 15 7 |
| Polled Scots—Two-year-olds | — | — | 18 7 | 16 1 |
| Herefords— ,, | 16 11 | 14 13 | — | — |
| Devons— ,, | 14 9 | 12 12 | — | — |
| Store Sheep:— | | | | |
| Hoggs, Hoggets, Tegs, and Lambs— | *s. d.* | *s. d.* | *s. d.* | *s. d.* |
| Downs or Longwools | 42 2 | 35 4 | — | — |
| Scotch Cross-breds | — | — | 35 2 | 30 4 |
| Store Pigs:— | | | | |
| 8 to 10 weeks old | 22 10 | 18 4 | 25 7 | 21 1 |
| 12 to 16 weeks old | 32 10 | 26 5 | 35 4 | 28 1 |

* Estimated carcass weight.

† Live weight.

## AVERAGE PRICES of DEAD MEAT at certain MARKETS in ENGLAND and SCOTLAND in the Month of April, 1911.

*(Compiled from Reports received from the Board's Market Reporters.)*

| Description. | Quality. | Birmingham. | Liverpool. | London. | Manchester. | Edinburgh. | Glasgow. |
|---|---|---|---|---|---|---|---|
| | | per cwt. | per cwt. | per cwt. | per cwt. | per cwt. | per cwt. |
| | | *s.* *d.* | *s.* *d.* | *s.* *d.* | *s.* *d.* | *s.* *d.* | *s.* *d.* |
| BEEF :— | | | | | | | |
| English ... ... | 1st | 55 6 | 55 0 | 56 6 | 55 6 | 56 0* | 58 0* |
| | 2nd | 50 6 | 50 6 | 54 0 | 52 6 | 51 6* | 56 0* |
| Cow and Bull ... | 1st | 49 0 | 46 0 | 47 0 | 49 0 | 47 6 | 49 6 |
| | 2nd | 43 6 | 39 0 | 42 6 | 44 6 | 41 0 | 43 6 |
| U.S.A. and Canadian :— | | | | | | | |
| Port Killed ... | 1st | 56 0 | 55 6 | 54 6 | 55 0 | — | — |
| | 2nd | 52 6 | 50 6 | 52 0 | 53 0 | — | 52 6 |
| Argentine Frozen— | | | | | | | |
| Hind Quarters... | 1st | 39 0 | 36 6 | 38 0 | 36 6 | 36 6 | 37 6 |
| Fore ,, ... | 1st | 28 6 | 28 0 | 27 0 | 28 0 | 28 6 | 27 6 |
| Argentine Chilled— | | | | | | | |
| Hind Quarters... | 1st | 41 0 | 41 0 | 42 6 | 41 6 | 40 0 | 43 0 |
| Fore ,, ... | 1st | 29 6 | 29 0 | 28 6 | 30 6 | 29 6 | 30 6 |
| Australian Frozen— | | | | | | | |
| Hind Quarters— | 1st | 36 6 | — | 38 0 | 33 6 | — | 34 6 |
| Fore ,, ... | 1st | 28 0 | — | 27 0 | 25 6 | — | 26 0 |
| VEAL :— | | | | | | | |
| British ... ... | 1st | 73 6 | 80 0 | 74 6 | 77 6 | — | — |
| | 2nd | 64 0 | 74 0 | 64 0 | 72 6 | — | — |
| Foreign ... ... | 1st | — | 71 6 | 73 6 | 69 6 | 76 6 | — |
| MUTTON :— | | | | | | | |
| Scotch ... ... | 1st | 65 6 | 77 6 | 75 0 | 78 0 | 64 0 | 70 0 |
| | 2nd | 56 0 | 71 6 | 63 6 | 73 6 | 53 0 | 57 0 |
| English ... ... | 1st | 63 6 | 69 6 | 60 0 | 70 0 | — | — |
| | 2nd | 56 0 | 61 0 | 55 6 | 61 0 | — | — |
| Argentine Frozen ... | 1st | 28 6 | 29 0 | 28 6 | 29 0 | 27 6 | 28 6 |
| Australian ,, ... | 1st | 27 6 | 27 0 | 26 6 | 27 0 | — | 27 0 |
| New Zealand ,, ... | 1st | — | — | 32 0 | — | — | 29 6 |
| LAMB :— | | | | | | | |
| British ... ... | 1st | — | 98 0 | 97 0 | 101 0 | — | — |
| | 2nd | 97 0 | 86 6 | 86 6 | 88 6 | — | — |
| New Zealand ... | 1st | 51 0 | 46 6 | 46 0 | 46 6 | 51 6 | 52 0 |
| Australian ... ... | 1st | 39 0 | 34 6 | 37 0 | 34 6 | 37 6 | 38 6 |
| Argentine ... ... | 1st | 39 0 | 38 0 | 37 6 | 38 0 | 36 0 | 38 6 |
| PORK :— | | | | | | | |
| British ... ... | 1st | 70 0 | 65 6 | 66 6 | 67 0 | 60 6 | 63 6 |
| | 2nd | 60 6 | 60 6 | 62 0 | 62 6 | 53 0 | 60 6 |
| Foreign ... ... | 1st | — | — | 62 6 | — | — | — |

* Scotch.

AVERAGE PRICES of **British Corn** per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882, in each Week in 1909, 1910 and 1911.

| Weeks ended (*in* 1911). | WHEAT. | | | | | | BARLEY. | | | | | | OATS. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1909. | | 1910. | | 1911. | | 1909. | | 1910. | | 1911. | | 1909. | | 1910. | | 1911. | |
| | *s.* | *d.* | *s.* | *d.* | *s.* | *d.* | *s.* | *d.* | *s.* | *d.* | *s.* | *d.* | *s.* | *d.* | *s.* | *d.* | *s.* | *d.* |
| Jan. 7 ... | 32 | 9 | 33 | 6 | 30 | 5 | 26 | 11 | 24 | 11 | 23 | 11 | 17 | 5 | 17 | 2 | 17 | 0 |
| ,, 14 ... | 32 | 8 | 33 | 8 | 30 | 8 | 27 | 1 | 24 | 11 | 23 | 10 | 17 | 5 | 17 | 7 | 17 | 2 |
| ,, 21 ... | 33 | 2 | 33 | 9 | 30 | 11 | 27 | 3 | 24 | 11 | 24 | 4 | 17 | 8 | 17 | 6 | 17 | 4 |
| ,, 28 ... | 33 | 0 | 33 | 6 | 30 | 11 | 27 | 6 | 25 | 0 | 24 | 5 | 17 | 9 | 17 | 4 | 17 | 3 |
| Feb. 4 ... | 33 | 4 | 33 | 7 | 30 | 9 | 27 | 7 | 24 | 10 | 24 | 5 | 17 | 10 | 17 | 7 | 17 | 5 |
| ,, 11 ... | 33 | 8 | 33 | 4 | 30 | 5 | 27 | 8 | 24 | 9 | 24 | 6 | 17 | 11 | 17 | 11 | 17 | 5 |
| ,, 18 ... | 34 | 1 | 33 | 0 | 30 | 3 | 27 | 11 | 24 | 6 | 24 | 7 | 18 | 0 | 18 | 0 | 17 | 6 |
| ,, 25 ... | 34 | 5 | 32 | 7 | 30 | 2 | 28 | 0 | 24 | 2 | 24 | 9 | 18 | 0 | 17 | 10 | 17 | 7 |
| Mar. 4 ... | 34 | 10 | 32 | 7 | 30 | 0 | 27 | 11 | 24 | 6 | 25 | 0 | 18 | 2 | 18 | 1 | 17 | 5 |
| ,, 11 ... | 35 | 8 | 32 | 6 | 30 | 1 | 28 | 4 | 24 | 1 | 25 | 0 | 18 | 2 | 18 | 0 | 17 | 5 |
| ,, 18 ... | 35 | 9 | 32 | 6 | 30 | 1 | 28 | 0 | 23 | 6 | 24 | 11 | 18 | 5 | 18 | 0 | 17 | 6 |
| ,, 25 ... | 36 | 0 | 32 | 9 | 30 | 2 | 28 | 0 | 23 | 7 | 25 | 0 | 18 | 6 | 17 | 11 | 17 | 5 |
| Apl. 1 ... | 36 | 5 | 33 | 0 | 30 | 3 | 27 | 10 | 23 | 8 | 24 | 11 | 18 | 8 | 18 | 0 | 17 | 5 |
| ,, 8 ... | 37 | 4 | 33 | 6 | 30 | 4 | 28 | 0 | 23 | 1 | 24 | 7 | 18 | 10 | 17 | 11 | 17 | 7 |
| ,, 15 ... | 38 | 7 | 33 | 7 | 30 | 3 | 27 | 8 | 23 | 5 | 25 | 2 | 19 | 2 | 18 | 3 | 18 | 3 |
| ,, 22 ... | 41 | 4 | 33 | 7 | 30 | 4 | 28 | 2 | 23 | 0 | 25 | 5 | 19 | 9 | 18 | 3 | 17 | 10 |
| ,, 29 ... | 42 | 5 | 33 | 0 | 30 | 11 | 27 | 10 | 22 | 10 | 25 | 5 | 20 | 0 | 18 | 3 | 18 | 3 |
| May 6 ... | 40 | 9 | 32 | 6 | 31 | 6 | 27 | 7 | 22 | 7 | 25 | 7 | 20 | 3 | 18 | 2 | 18 | 6 |
| ,, 13 ... | 41 | 6 | 32 | 1 | | | 27 | 3 | 22 | 0 | | | 20 | 6 | 18 | 1 | | |
| ,, 20 ... | 42 | 8 | 31 | 10 | | | 27 | 0 | 21 | 8 | | | 20 | 11 | 17 | 8 | | |
| ,, 27 ... | 42 | 6 | 31 | 3 | | | 26 | 3 | 21 | 4 | | | 21 | 0 | 17 | 10 | | |
| June 3 ... | 43 | 1 | 30 | 2 | | | 25 | 7 | 21 | 8 | | | 21 | 3 | 17 | 10 | | |
| ,, 10 ... | 42 | 11 | 29 | 1 | | | 26 | 10 | 20 | 9 | | | 21 | 4 | 17 | 10 | | |
| ,, 17 ... | 42 | 7 | 29 | 0 | | | 26 | 10 | 18 | 11 | | | 21 | 6 | 18 | 0 | | |
| ,, 24 ... | 42 | 8 | 29 | 4 | | | 27 | 2 | 20 | 1 | | | 21 | 7 | 17 | 9 | | |
| July 1 ... | 42 | 9 | 29 | 9 | | | 27 | 2 | 19 | 11 | | | 21 | 9 | 17 | 7 | | |
| ,, 8 ... | 43 | 0 | 30 | 4 | | | 26 | 4 | 19 | 5 | | | 21 | 8 | 17 | 4 | | |
| ,, 15 ... | 43 | 3 | 31 | 1 | | | 26 | 10 | 21 | 3 | | | 21 | 9 | 17 | 7 | | |
| ,, 22 ... | 44 | 0 | 31 | 11 | | | 27 | 4 | 19 | 9 | | | 22 | 5 | 17 | 5 | | |
| ,, 29 ... | 43 | 5 | 33 | 5 | | | 24 | 6 | 20 | 10 | | | 22 | 2 | 18 | 1 | | |
| Aug. 5 ... | 44 | 9 | 33 | 9 | | | 27 | 4 | 20 | 5 | | | 22 | 11 | 18 | 3 | | |
| ,, 12 ... | 44 | 9 | 33 | 5 | | | 24 | 9 | 20 | 4 | | | 21 | 8 | 18 | 0 | | |
| ,, 19 ... | 41 | 6 | 32 | 11 | | | 23 | 11 | 20 | 11 | | | 19 | 8 | 17 | 11 | | |
| ,, 26 ... | 38 | 5 | 32 | 7 | | | 24 | 7 | 20 | 10 | | | 19 | 4 | 17 | 2 | | |
| Sept. 2 ... | 37 | 2 | 32 | 2 | | | 26 | 3 | 22 | 10 | | | 19 | 6 | 17 | 2 | | |
| ,, 9 ... | 34 | 11 | 31 | 11 | | | 26 | 1 | 23 | 3 | | | 18 | 5 | 17 | 2 | | |
| ,, 16 ... | 33 | 6 | 30 | 11 | | | 26 | 5 | 24 | 3 | | | 17 | 9 | 16 | 6 | | |
| ,, 23 ... | 32 | 9 | 30 | 2 | | | 26 | 8 | 24 | 2 | | | 17 | 7 | 16 | 3 | | |
| ,, 30 ... | 32 | 2 | 30 | 1 | | | 26 | 9 | 24 | 4 | | | 17 | 2 | 16 | 4 | | |
| Oct. 7 ... | 31 | 8 | 30 | 1 | | | 26 | 9 | 24 | 7 | | | 17 | 0 | 16 | 3 | | |
| ,, 14 ... | 31 | 4 | 30 | 2 | | | 27 | 0 | 25 | 1 | | | 17 | 0 | 16 | 2 | | |
| ,, 21 ... | 31 | 8 | 30 | 4 | | | 27 | 7 | 25 | 3 | | | 16 | 11 | 16 | 1 | | |
| ,, 28 ... | 31 | 10 | 30 | 4 | | | 27 | 9 | 25 | 4 | | | 17 | 0 | 16 | 2 | | |
| Nov. 4 ... | 32 | 5 | 30 | 4 | | | 27 | 9 | 25 | 6 | | | 17 | 0 | 16 | 2 | | |
| ,, 11 ... | 32 | 5 | 29 | 11 | | | 27 | 7 | 25 | 4 | | | 17 | 1 | 15 | 11 | | |
| ,, 18 ... | 32 | 7 | 29 | 8 | | | 27 | 0 | 25 | 1 | | | 17 | 4 | 16 | 1 | | |
| ,, 25 ... | 33 | 0 | 29 | 11 | | | 26 | 8 | 24 | 10 | | | 17 | 3 | 16 | 4 | | |
| Dec. 2 ... | 33 | 3 | 30 | 6 | | | 26 | 1 | 24 | 7 | | | 17 | 4 | 16 | 7 | | |
| ,, 9 ... | 33 | 3 | 30 | 9 | | | 25 | 7 | 24 | 3 | | | 17 | 3 | 16 | 9 | | |
| ,, 16 ... | 33 | 2 | 30 | 7 | | | 25 | 3 | 23 | 9 | | | 17 | 4 | 16 | 10 | | |
| ,, 23 ... | 33 | 1 | 30 | 7 | | | 25 | 2 | 23 | 10 | | | 17 | 4 | 16 | 9 | | |
| ,, 30 ... | 33 | 3 | 30 | 5 | | | 25 | 1 | 23 | 9 | | | 17 | 4 | 16 | 9 | | |

NOTE.—Returns of purchases by weight or weighed measure are converted to Imperial Bushels at the following rates: Wheat, 60 lb.; Barley, 50 lb.; Oats, 39 lb. per Imperial Bushel.

## AVERAGE PRICES of **Wheat, Barley,** and **Oats** per Imperial Quarter in FRANCE, BELGIUM, and GERMANY, and at PARIS, BERLIN, and BRESLAU.

| | | Wheat. | | Barley. | | Oats. | |
|---|---|---|---|---|---|---|---|
| | | 1910. | 1911. | 1910. | 1911. | 1910. | 1911. |
| | | *s.* *d.* | *s.* *d.* | *s.* *d.* | *s.* *d.* | *s.* *d.* | *s.* *d.* |
| France : | March | 41 11 | 46 5 | 25 11 | 26 8 | 21 10 | 21 11 |
| | April | 42 2 | 45 11 | 25 11 | 26 6 | 21 10 | 21 11 |
| Paris : | March | 43 1 | 47 0 | 24 8 | 24 8 | 21 6 | 22 8 |
| | April | 43 0 | 46 1 | 24 8 | 24 8 | 22 1 | 23 4 |
| Belgium : | February | 36 7 | 32 4 | 23 6 | 24 1 | 19 7 | 19 2 |
| | March | 35 10 | 32 5 | 23 10 | 24 7 | 19 8 | 19 8 |
| Germany : | February | 45 11 | 40 9 | 25 10 | 28 4 | 21 6 | 21 9 |
| | March | 45 7 | 40 6 | 25 9 | 29 0 | 21 3 | 22 3 |
| Berlin : | February | 48 9 | 42 7 | — | — | 23 1 | 21 4 |
| | March | 48 0 | 42 6 | — | — | 22 5 | 21 8 |
| Breslau : | February | 45 7 | 38 1 | 25 4* / 24 2† | 27 7* / 22 11† | 20 6 | 19 10 |
| | March | 44 8 | 37 10 | 25 4* / 24 2† | 27 7* / 22 11† | 19 11 | 20 1 |

* Brewing. † Other.

NOTE.—The prices of grain in France have been compiled from the official weekly averages published in the *Journal d'Agriculture Pratique*; the Belgian quotations are the official monthly averages published in the *Moniteur Belge*; the German quotations are taken from the *Deutscher Reichsanzeiger*, the prices for the German Empire representing the average of the prices at a number of markets.

## AVERAGE PRICES of **British Wheat, Barley,** and **Oats** at certain Markets during the Month of April, 1910 and 1911.

| | Wheat. | | Barley. | | Oats. | |
|---|---|---|---|---|---|---|
| | 1910. | 1911. | 1910. | 1911. | 1910. | 1911. |
| | *s.* *d.* | *s.* *d.* | *s.* *d.* | *s.* *d.* | *s.* *d.* | *s.* *d.* |
| London... ... ... | 34 1 | 31 9 | 22 5 | 24 1 | 18 5 | 18 9 |
| Norwich ... ... | 33 1 | 30 6 | 23 4 | 24 11 | 17 9 | 17 9 |
| Peterborough ... ... | 32 7 | 29 11 | 21 5 | 24 10 | 17 11 | 17 7 |
| Lincoln... ... ... | 33 0 | 29 11 | 20 9 | 25 9 | 18 4 | 17 10 |
| Doncaster ... ... | 33 0 | 29 9 | 23 0 | 24 10 | 18 4 | 17 6 |
| Salisbury ... ... | 33 9 | 30 1 | 23 5 | 23 9 | 17 9 | 17 1 |

## AVERAGE PRICES of PROVISIONS, POTATOES, and HAY at certain MARKETS in ENGLAND in the Month of April, 1911.

*(Compiled from Reports received from the Board's Market Reporters.)*

| Description. | Bristol. | | Liverpool. | | London. | |
|---|---|---|---|---|---|---|
| | First Quality. | Second Quality. | First Quality. | Second Quality. | First Quality. | Second Quality. |
| | *s. d.* | *s. d.* | *s. d.* | *s. d.* | *s. d.* | *s. d.* |
| BUTTER :— | per 12 lb. | per 12 lb. | per 12 lb. | per 12 lb. | per 12 lb. | per 12 lb. |
| British ... ... | 14 0 | 13 0 | — | — | 13 9 | 12 0 |
| | per cwt. | per cwt. | per cwt. | per cwt. | per cwt. | per cwt. |
| Irish Creamery ... | — | — | 103 6 | 101 0 | 108 0 | — |
| ,, Factory ... | — | — | 94 6 | 86 6 | 94 0 | 88 0 |
| Danish ... ... | — | — | 117 6 | 115 6 | 118 0 | 116 0 |
| French ... ... | — | — | — | — | 122 0 | 116 0 |
| Russian ... ... | 102 6 | 99 0 | 102 0 | 96 0 | 102 6 | 99 6 |
| Australian ... ... | 104 0 | 100 0 | 102 0 | 98 0 | 106 0 | 102 0 |
| New Zealand ... | 110 0 | 106 0 | 110 6 | 107 0 | 109 6 | 105 6 |
| Argentine ... ... | — | — | 100 0 | 98 0 | 102 0 | 99 0 |
| CHEESE :— | | | | | | |
| British— | | | | | | |
| Cheddar ... ... | 76 0 | 70 0 | 74 0 | 70 0 | 79 0 | 74 0 |
| | | | 120 lb. | 120 lb. | 120 lb. | 120 lb. |
| Cheshire ... ... | — | — | 70 0 | 64 0 | 82 6 | 78 0 |
| | | | per cwt. | per cwt. | per cwt. | per cwt. |
| Canadian ... ... | 64 0 | 62 0 | 64 0 | 62 0 | 64 6 | 63 6 |
| BACON :— | | | | | | |
| Irish ... ... ... | 68 6 | 64 6 | 68 0 | 62 0 | 71 0 | 66 6 |
| Canadian ... ... | 59 0 | 56 6 | 57 6 | 53 0 | 59 6 | 57 0 |
| HAMS :— | | | | | | |
| Cumberland ... ... | — | — | — | — | 108 6 | 100 6 |
| Irish ... ... ... | — | — | — | — | 106 6 | 100 0 |
| American (long cut) ... ... | 59 6 | 53 6 | 57 0 | 0 | 62 0 | 57 0 |
| EGGS :— | per 120. | per 120. | per 120. | per 120. | per 120. | per 120. |
| British ... ... | 8 9 | — | — | — | 9 4 | 8 6 |
| Irish ... ... ... | 8 3 | 7 9 | 8 3 | 7 5 | 8 5 | 7 1 |
| Danish ... ... | — | — | 9 0 | 8 6 | 9 4 | 7 7 |
| POTATOES :— | per ton. | per ton. | per ton. | per ton. | per ton. | per ton. |
| Langworthy ... ... | 111 0 | 93 6 | 96 6 | 90 0 | 121 0 | 111 0 |
| Scottish Triumph ... | 108 6 | 95 0 | 96 6 | 90 0 | 112 6 | 105 0 |
| Up-to-Date ... ... | 108 6 | 93 6 | 96 6 | 90 0 | 112 0 | 102 6 |
| HAY :— | | | | | | |
| Clover ... ... | 90 0 | 75 0 | 95 0 | 70 0 | 100 0 | 83 6 |
| Meadow ... ... | 77 6 | 60 0 | — | — | 89 0 | 66 6 |

## DISEASES OF ANIMALS ACTS, 1894 to 1910.

### NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered.

### GREAT BRITAIN.

*(From the Returns of the Board of Agriculture and Fisheries.)*

| DISEASE. | APRIL. | | FOUR MONTHS ENDED APRIL. | |
|---|---|---|---|---|
| | 1911. | 1910. | 1911. | 1910. |
| **Swine-Fever:—** | | | | |
| Outbreaks ... ... .. | 242 | 84 | 755 | 381 |
| Swine Slaughtered as diseased or exposed to infection ... | 2,238 | 822 | 7,969 | 3,032 |
| **Anthrax:—** | | | | |
| Outbreaks* ... ... ... | 82 | 117 | 343 | 522 |
| Animals attacked ... .. | 98 | 147 | 398 | 645 |
| **Foot-and-Mouth Disease:—** | | | | |
| Outbreaks ... ... ... | — | — | 1 | — |
| Animals attacked ... ... | — | — | 18 | — |
| **Glanders** (including Farcy):— | | | | |
| Outbreaks ... ... ... | 19 | 31 | 71 | 124 |
| Animals attacked ... ... | 31 | 53 | 214 | 312 |
| **Sheep-Scab:—** | | | | |
| Outbreaks ... ... ... | 12 | 18 | 287 | 301 |

* For 1910 the figures show the outbreaks reported, but for 1911 the outbreaks confirmed.

### IRELAND.

*(From the Returns of the Department of Agriculture and Technical Instruction for Ireland.)*

| DISEASE. | APRIL. | | FOUR MONTHS ENDED APRIL. | |
|---|---|---|---|---|
| | 1911. | 1910. | 1911. | 1910. |
| **Swine-Fever:—** | | | | |
| Outbreaks ... ... ... | 10 | 18 | 45 | 29 |
| Swine Slaughtered as diseased or exposed to infection ... | 133 | 388 | 799 | 685 |
| **Anthrax:—** | | | | |
| Outbreaks ... ... ... | — | — | 3 | 4 |
| Animals attacked ... ... | — | — | 3 | 6 |
| **Glanders** (including Farcy):— | | | | |
| Outbreaks ... ... ... | — | 1 | 1 | 1 |
| Animals attacked ... ... | 1 | 2 | 2 | 2 |
| **Sheep-Scab:—** | | | | |
| Outbreaks ... ... ... | 22 | 37 | 224 | 291 |

# SELECTED CONTENTS OF PERIODICALS.

**Agriculture, General and Miscellaneous—**

Über die Bedeutung der Bodenkarten für Bodenkunde und Landwirtschaft, *Dr. E. Blanck.* (Fühling's Land. Ztg., February 15th, 1911.) [B. 40–1.]

Breeding Problems in the Plant World, *J. H. Priestley.* [B. 17.] The Pollen of Flowers, *S. Leonard Bastin.* [B. 16–5.] The Farmer's Interest in Seeds, *Donald McDonald.* [B. 18.] (Jour. Bath and West and S.C. Soc., Vol. V., Fifth Series, 1910–11.)

Versuche über die Impfung von Leguminosen mit Knöllchenbakterien, *Drs. Gerlach* and *Vogel.* (Mitt. K. Wilhelms Inst. Landw. Bromberg, Band I., Heft 2.) [B. 28–5.]

**Field Crops—**

Bericht über die Anbauversuche der Deutschen Kartoffel-Kultur-Station im Jahre 1910, *Dr. C. von Eckenbrecher.* (Ztschr. Spiritusindus., Ergänzungsheft, 1911.) [C. 26–3.]

Beet Sugar: Can it be made profitably in Great Britain? *F. J. Lloyd.* Trans. Surv. Inst., Vol. XLIII., Part VII., 1911.) [C. 34–5.]

Beet Sugar and Sugar Beet, *C. Kains-Jackson.* (Jour. Bath and West and S.C. Soc., Vol. V., Fifth Series, 1910–11.) [C. 34–3.]

Some Aspects of the International Wheat Trade, *J. H. Hubback.* (Econ. Jour., March, 1911.) [C. 2–3.]

Water Meadows in South Wiltshire and How they Affect the Farms they Adjoin, *G. R. Kendle.* (Jour. Land Agents' Soc., April, 1911.) [C. 42–1.] [M. 8.]

Die Verbesserung unserer Wiesenmoore, *C. Luedecke.* (Fühling's Landw. Ztg., April 1st, 1911.) [B. 52.]

**Live Stock—**

Cows for Draught Purposes, *J. Wrightson.* [F. 66–1.] Feeding Experiments, with Soya Bean Cake, *C. T. Gimingham.* [F. 74–5; C. 44–5.] (Jour. Bath and West and S.C. Soc., Vol. V., Fifth Series, 1910–11.)

Ueber die Giftigkeit der Rizinussamen—Mit Rizinussamen verfälschte Erdnussmehle, *Dr. Miessner.* (Mitt. K. Wilhelms Inst. Landw. Bromberg, Band I., Heft 3.) [F. 74–3.]

Fütterungsversuche mit getrockneten Kartoffeln, *Dr. Gerlach.* (Mitt. K. Wilhelms Inst. Landw. Bromberg, Band I., Heft 2.) [F. 74–3; C. 26–7.]

**Dairying and Food, General—**

The Coagulation of Condensed Milk, *R. Greig-Smith.* (Proc. Linn. Soc., N.S. Wales, 1909, Part I.) [G. 56–1.]

The Manufacture of Stilton and Wensleydale Cheese, *John Benson.* [G. 66–3.] Report of the Investigation into the Cellular Elements Present in Milk. Part II.:—Quantitative and Qualitative Results. Part III.:—The Milk of Animals other than the Cow, *R. T. Hewlett, S. Villar,* and *C. Revis.* [G. 56–3; H. 36–1.] (Jour. Brit. Dairy Farmers' Assoc., Vol. XXXV., 1911.)

Weitere Untersuchungen über den Einfluss von Reizstoffen auf die Milchsekretion, *G. Fingerling.* Uber den Einfluss verschiedener wässriger Futtermittel auf die Menge und Zusammensetzung der Milch, *F. Tangl* and *A. Zaitschek.* Uber den Einfluss der Futtermittel auf die Zusammensetzung des Milchfettes, *A. Zaitschek.* (Landw. Vers. Stat., Vol. LXXIV., 1911, Heft III.–V.) [G. 50–7.]

Bakteriologische Studien über dänische Butter, *O. Jensen.* (Centbl. Bakt. [&c.], Band 29, No. 23–25, 1911.) [G. 54–3; G. 60–3.]

Untersuchungen über die Wirkung von Palmkernkuchen auf die Milchproduktion, *Dr. O. Kellner.* (Mitt. Deut. Landw. Gesell., April 15th, 1911.) [G. 50–7.]

**Veterinary Science—**

Die Behandlung und Bekämpfung der Maul- und Klauenseuche, *Prof. Eggeling.* (Mitt. Deut. Landw. Gesell., March 18th, 1911.) [H. 36–9.]

Die Bradsot der Schafe, *Dr. Miessner.* [Mitt. K. Wilhelms Inst. Landw Bromberg, Band I., Heft 3.] [H. 42–7.]

**Forestry—**

The Beechwood Industry of the Chilterns, *W. Dallimore.* (Kew Bulletin, No. 2, 1911.) [L. 28–1.]

La Conservation des Bois dans les Constructions. Chapitre I. :—La Chimie du Bois Sain, *C. Malenkovic.* (Ann. Sci. Agron., Mars, 1911.) [L. 28–3.]

**Engineering—**

Experiments with "Waterfinders," *Prof. J. Wertheimer.* (Jour. Roy. Soc. Arts, February 24th, 1911.) [M. 10.]

**Economics—**

Prix officiels des céréales, &c., produites en 1910. (Denmark, Commun. Statistiques, Tome XXXV., Livr. V.) [N. 34–1.] (This report gives the prices of agricultural produce in Denmark for the year 1910, with averages for previous years.)

## ADDITIONS TO THE LIBRARY.

[NOTE.—The receipt of *annual* publications of foreign agricultural and other departments, experiment stations and societies is not noted in the monthly list of additions to the Library. A list of these publications appeared in the *Journal* for October, November, and December, 1909.]

**Agriculture, General and Miscellaneous—**

*U.S. Dept. of Agriculture, Bureau of Plant Industry.*—Circ. No. 73 :—The Distinguishing Characters of the Seeds of Quack-Grass and of Certain Wheat-Grasses. (9 pp.) [B. 20–3.] Bull. No. 202 :—The Seedling-Inarch and Nurse-Plant Methods of Propagation. (43 pp. and plates.) [B. 17.] Washington, 1911.

*U.S. Dept. of Agriculture, Bureau of Soils.*—Bull. No. 75 :—Lawn Soils. (55 pp.) [B. 40–1.] Bull. No. 76 :—A Review of the Phosphate Fields of Florida. (23 pp.) [B. 30.] Washington, 1911.

*New South Wales, Dept. of Agriculture.*—Farmers' Bull. No. 43 :—Book-keeping for Farmers. (20 pp.) Sydney, 1910. [B. 50.]

*Public Accounts Committee.*—Copy of Epitome of the Reports from the Committees of Public Accounts, 1857 to 1910, and of the Treasury Minutes thereon, with an Index. (572 pp.) London : Wyman and Sons, Ltd., 1911. *2s. 3d.* [A. 2–1.]

*Departmental Committee upon the Work of the Congested Districts (Scotland) Commissioners for the Improvement of Live Stock and Agriculture.*—Minutes of Evidence and Index. [Cd. 5509.] (133 pp.) London : Wyman and Sons, 1911. *1s. 2d.* [A. 12 ; F. 2.]

*Johnson, S. W.*—How Crops Grow : a Treatise on the Chemical Composition, Structure, and Life of the Plant. (416 pp.) New York : Orange Judd Co., 1908. *7s. 6d.* [B. 16–3.]

*United States.*—An Act making Appropriations for the Dept. of Agriculture for the Fiscal Year ending June thirtieth, nineteen hundred and twelve. (34 pp.) Washington, 1911. [A. 80.]

*Colonial Reports—Miscellaneous, No. 75.*—The Imperial Department of Agriculture in the West Indies. [Cd. 5515.] (16 pp.) London : Wyman and Sons, 1911. *1½d.* [A. 100.]

*Bengal, Dept. of Agriculture.*—Departmental Records, No. 1, 1910 :—Some Suggestions as to the Organisation of Agricultural Exhibitions in Bengal. (28 pp. and plates.) Calcutta : Bengal Secretariat Press, 1910. [A. 60.]

*West of Scotland Agricultural College.*—Bull. No. 55 :—Reports on Experiments (*a*) On the Best Method of Applying Lime to Arable Land, and (*b*) On the Relative Economy of Ground and Slaked Lime, conducted in the Years 1902–9. (195–221 pp.) Glasgow, 1911. [B. 24–5.]

*Wood, T. B.*—A Course of Practical Work in Agricultural Chemistry for Senior Students. (56 pp.) Cambridge : University Press, 1911. 2*s.* 6*d.* net. [B. 22–5.]

*South Australia, Intelligence Dept.*—Special Intelligence Bull. No. 17 :—Report on Recent Development in Economic Geology. (20 pp.) Adelaide, 1910. [B. 36.]

*Deutsche Landwirtschafts-Gesellschaft.*—Arbeiten. Heft 178 :—Die Entstehung der Seemarschen. (49 pp.) [B. 56.] Heft 179 :—Eine Studienfahrt durch Schleswig-Holstein, 1910. (62 pp.) [A. 28.] Berlin : Paul Parey, 1911.

*Brenchley, W. E.*—The Weeds of Arable Land in Relation to the Soils on which they Grow. [Annals of Botany, Vol. XXV., No. XCVII., January, 1911.] (155–165 pp.) 1911. [B. 20–3.]

*Seymour, A. H.*—Report to the Governor on the Possibilities of Agricultural Development in Newfoundland, 1909. (32 pp.) St. Johns, N.F., 1910. [A. 74.]

*U.S. Dept. of Agriculture, Office of Experiment Stations.*—Circ. No. 109 :—Agricultural Fair Associations and their Utilisation in Agricultural Education and Improvement. (23 pp.) Washington, 1911. [A. 80 ; B. 44–17.]

*U.S. Dept. of Agriculture, Bureau of Chemistry.*—Circ. No. 69 :—Improvements in the Knorr Fat Extraction Apparatus. (4 pp.) Washington, 1911. [B. 22–5.]

*Johannsen, W.*—Elemente der Exakten Erblichkeitslehre. (516 pp.) Jena : Gustav Fischer, 1909. [B. 17.]

*Lancaster County Council, Agricultural Dept.*—Farmers' Bull. No. 20 :—Report of Experiments with Nitrogenous Manures. (10 pp.) Preston, 1911. [B. 28–1.]

*Haggard, H. Rider.*—Rural Denmark and its Lessons. (335 pp.) London : Longmans, Green and Co., 1911. 6*s.* 6*d.* net. [A. 36 ; N. 4–7.]

*U.S. Dept. of Agriculture.*—Farmers' Bull. No. 432 :—How a City Family Managed a Farm. (28 pp.) Washington, 1911. [A. 80.]

*Priestley, J. H.*—Electricity as a Factor in Crop Production. (37–54 pp.) [Journal of the Farmers' Club, April, 1911.] [B. 34.]

*Schnell, Dr.*—Zur Vergangenheit und Zukunft der Landschule. (343–395 pp.) [Landarbeit und Kleinbesitz, Heft 11.] Berlin : Paul Parey, 1911. [B. 44–3.]

**Field Crops—**

*Midland Agricultural and Dairy College.*—Bull. No. 1, 1910–11 :—Manuring for Milk, a second interim Report on an experiment commenced in April, 1909 and continued in 1910. (7 pp.) [C. 42–9.] Bull. No. 2, 1910–11 :—Report on Field Trials on the Manuring of Seeds Hay (Rye Grass and Clover, One Year's Ley.) (8–15 pp.) [C. 42–9.] Bull. No. 3, 1910–11 :—Results of Field Trials on the Manuring of Potatoes in 1910. (16–22 pp.) [C. 26–5.] Bull. No. 4, 1910–11 :—Report on Field Trials on the Manuring of Mangels in the Year 1910. (23–26 pp.) [C. 32.] Bull. No. 5, 1910–11 :—Report on Field Trials with Varieties of Mangels. (27–34 pp.) [C. 32.] Bull. No. 6, 1910–11 :—Report on Field Trials with Varieties of Swedes. (35–41 pp.) [C. 32.] Bull. No. 7, 1910–11 :—Results of Field Trials on the Manuring of Swedes. (43–47 pp.) [C. 32.] Kingston, Derby, 1911.

Finance (1909–10) Act, 1910.—Copy of Regulations in relation to Tobacco grown in the United Kingdom. (8 pp.) London: Wyman and Sons, 1911. 1*d*. [C. 54.]

*University College of N. Wales, Bangor, Agricultural Department.*—Bull. No. II.:—Mixtures of Grass and Clover Seeds (Sown 1906), 1910. (8 pp.) [C. 42–1.] Bull. No. III.:—Experiment on the Manuring of Grass Land at Quirt, Dwyran, 1910. [C. 42–9.] Bull. No. IV.:—Mixtures of Grass and Clover Seeds (Sown 1909), 1910. (6 pp.) [C. 42–1.] Bangor, 1911.

*Ireland, Dept. of Agriculture and Technical Instruction.*—Departmental Committee on the Irish Flax-Growing Industry, Minutes of Evidence, Appendices and Index. [Cd. 5503.] (505 pp.) London: Wyman and Sons, 1911. 4*s*. 1*d*. [C. 48.]

*New South Wales, Dept. of Agriculture.*—Farmers' Bull. No. 36:—Sorghum. (19 pp.) [C. 34–9.] No. 37:—Lucerne. (118 pp.) [C. 44–3.] No. 41:—Varieties of Wheat Recommended by the Dept. of Agriculture. (24 pp.) [C. 2–1.] Sydney, 1910.

*New York Agricultural Experiment Station.*—Bull. No. 327:—Potato Fertilisers: Method of Application and Form of Nitrogen. (281–304 pp.) Geneva, New York, 1910. [C. 26–5.]

*Kentucky Agricultural Experiment Station.*—Bull. No. 149:—Bleached Flour. (65–124 pp.) Lexington, Kentucky, 1910. [C. 4; G. 73.]

*Purdue University Agricultural Experiment Station.*—Circ. No. 23:—How to Grow More and Better Wheat. (40 pp.) Lafayette, Indiana, 1910. [C. 2–1.]

*West of Scotland Agricultural College.*—Bull. No. 56:—Reports on Experiments (*a*) On the Best Seed of Potato Oats. (223–229 pp.) Glasgow, 1911. [C. 16.]

*U.S. Dept. of Agriculture.*—Farmers' Bull. No. 414:—Corn Cultivation. (32 pp.) 1910. [C. 20.] No. 424:—Oats: Growing the Crop. (44 pp.) 1910. [C. 16.] No. 429:—Industrial Alcohol: Sources and Manufacture. (32 pp.) 1911. [C. 28.] Washington.

*U.S. Dept. of Agriculture, Bureau of Plant Industry.*—Circ. No. 74:—The Sulphur Bleaching of Commercial Oats and Barley. (13 pp.) [C. 8; C. 16.]

*Lancaster County Council, Agricultural Dept.*—Farmers' Bull. No. 18:—Report of Field Trials with Varieties of Oats. (7 pp. and chart.) [C. 16.] No. 19:—Report of Field Trials on the Manuring of Mangels, 1907–10. (8 pp. and chart.) [C. 32.] Preston, 1911.

*North Dakota Agricultural Experiment Station.*—Bull. No. 89:—Wheat Investigations; Milling, Baking, and Chemical Tests. (80 pp.) Fargo, North Dakota, 1910. [C. 2–1.]

**Horticulture—**

*U.S. Dept. of Agriculture, Bureau of Plant Industry.*—Bull. No. 193:—Experiments in Blueberry Culture. (100 pp.) [D. 37.] Bull. No. 194:—Summer Apples in the Middle Atlantic States. (96 pp. and plates.) [D. 6.] Washington, 1910.

*U.S. Dept. of Agriculture, Bureau of Chemistry.*—Circ. No. 68:—Tomato Ketchup under the Microscope: with Practical Suggestions to Ensure a Cleanly Product. (14 pp.) Washington, 1911. [D. 38–1; G. 72.]

*Quinn, G.*—Fruit Tree Pruning, a Practical Text-book for Fruitgrowers Working under the Climatic and Economic Conditions Prevailing in Temperate Australia. (230 pp.) Adelaide: Government Printer, 1910. 1*s*. 3*d*. [D. 28–5.]

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